

June 29, 1959

Aviation Week

Including Space Technology

75 Cents

A McGraw-Hill Publication

Paris Air Show
Missiles, Planes

G.91 Operates
Off Grass Strip



Boeing B-52 Drops North American X-15



Convair's B-36 and the USAF Strategic Air Command combined to deter aggression and to prevent global conflict during the decade 1949-1958—the most tested period in all of history.

As the ultimate development of piston-engine aircraft, the B-36 became an unapologetic statement of our national policy to maintain world peace. The B-36 proved to America and to the world that *size means a peace power!*

And now, to continue peace through airpower, Convair, a Division of General Dynamics, has designed and is producing the B-52 Strategic Bomber and the Atlas ICBM—both among the most advanced systems of the Strategic Air Command who have established that *Peace is Their Preference*.

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*Space Technology Laboratories' new corporate symbol represents a bright future in a stimulating age. * STL has presided the over-all systems engineering and technical direction for the Air Force Ballistic Missile Program since it was assigned the highest national priority in 1954. Five years of accelerated effort produced epic advances in science and technology, and propelled the art of warfarine through three distinct generations of progress. STL contributed technical leadership to the science/government/industry team which has built this solid, expandable foundation for future advances in space, and is daily adding new strength to our national security. * In addition to its major management function, STL also conducts advanced space probe experiments for the Air Force at the direction of such agencies as NASA and ARPA. * To these scientists and engineers, thermodynamicist, aerodynamicist, structures, electrophysicist, computer disciplines, STL now offers unique professional opportunities. Inquiries with capabilities in propulsion, electronics, acoustics, and other related fields and regarding staff position at STL, are invited.*



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for a new era of
technology

Space Technology Laboratories, Inc. P.O. BOX 95004, LOS ANGELES 45, CALIFORNIA

Pressure Potentiometers for...

HIGH TEMPERATURES and CORROSIVE FLUIDS



Type P103
Pressure Potentiometer
shown in cutaway



New Trans-Sonic[®] Pressure Potentiometers, Type P103, measure pressure of corrosive fluids such as red fuming nitric acid (RFNA) and unsymmetrical dinitroxyhydrazine (UDMH). For aerospace and control applications at ambient temperatures up to 600°F.

Corrosive fluids are contained by a welded Inconel X bellows which actuates a dynamically balanced mechanism. This potentiometer is hermetically sealed in a stainless steel case for protection against corrosion and other environmental hazards.

Accurate and reliable performance has been proven under the following conditions typical of missile environments: Random Gaussian Excitation 0.1g/ $\sqrt{\text{Hz}}$ to 2,000 cpm; Acceleration 75g; Shock 72g.

Flexibility of installation is assured by small size and light weight. Dimensions are 1½" diameter by 1¾" long. Weight is only 6 ounces. Standard weights are 0.100 and 0.150 lbs. — other ranges in special order. Write for Technical Bulletin PU-1 to Trans-Sonic, Inc., Dept. 7, Burlington, Mass.

TRANS-SONICS

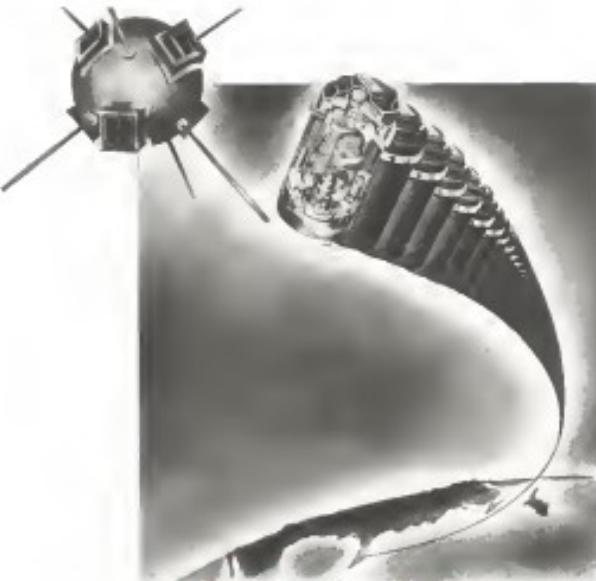
Precision Transducers

AVIATION CALENDAR

[Continued from page 5]

Sept. 18–21—Western Electronic Engineering Research Institute, University, Stanford, Calif.
Aug. 24–26—Western Electronic Show & Convention, Institute of Radio Engineers, Calif.
Aug. 24–26—Orbital Dynamics Symposium, American Rocket Society, Northwestern University, Evanston, Ill.
Aug. 26–28—Sections of the Aerospace Sciences National Specialty Meeting: a symposium on antiaircraft warfare; electronic countermeasures; and space.
Aug. 27–28—International Communications Specialty Symposium, Clash House Laboratories, London, England.
Aug. 31–Sept. 2—Annual Army Navy Invitational Precision Pressure (ANIP) Symposium and Induction, Boeing, Seattle, Wash. Aug. 31–Sept. 2—
Aug. 31–Sept. 4—1979 Annual Congress International Astronautics Federation, Clash House, Westminster, London.
Sept. 12—Conference on physical chemistry in aerodynamics and space flight, University of Pennsylvania, Philadelphia, Pa.
Sept. 20–21—Air Force Office of Scientific Research and General Electric Co's Air Force and Space Vehicle Dept.
Sept. 24–26—1979 Critical Engineering Conference, University of California, Berkeley.
Sept. 26—National Committee and Association Presidents, Air Test Area, Boblo Island, Mich., Mackinac Beach, Mich.
Sept. 27–1979 Farnborough Photo Display and Exhibition Society of British Aircraft Constructors, Farnborough, Eng.
Sept. 9–11—Sixth Midwinter Conference on Space Physics and Space Mathematics, University of Texas, Austin, Tex. Session A12881 (Deputy of Astronautical Sciences, Office of Naval Research, National Science Foundation).

Sept. 16–17—Twelfth Regional Meeting on Design, Service and Packaging, Institute of the Armed Services, Los Angeles, Calif.
Sept. 20–23—1979 Annual Conference and Exhibit, International Society of America Chicago Aerobionics Cleve, II
Sept. 21–24—1979 International Stand and Equipment Show, International Hotel, Bangkok, Thailand.
Sept. 23–24—Lugos and Cholulaan Symposia, Arcoach Corp., Morristown, N.J.
Sept. 24–25—Solid Propellant Conference, International Rocket Society, Princeton University, Princeton, N.J.
Sept. 24–27—1979 National Symposium on Telecommunications, Civic Auditorium and Whittier Island, San Francisco, Calif.
Sponsoring Institute of Radio Engineers, Professional Group on Space Electronics Division, Princeton, N.J.
Oct. 5–7—Fourth Anglo-American Astronautical Conference, Institute of the American Astronautical Society, Hotel Astor, New York City.
Oct. 5–10—National Aerospace Meeting, Society of Aerospace Engineers, Inc., Anaheim, Los Angeles, Calif.
Oct. 6–8—1979 Annual Meeting, International Astronautical Association, Hotel Leningrad, Moscow, Russia.
Oct. 12–16—1979 General Conference of the International Air Transport Association, Tokyo, Japan.



300,000 Gyros Later...

Honeywell's accomplishments in the design and manufacture of precision gyro data date back to World War II. From the thousands of Model XV Fine Control Gyros used by our Navy in the famous C-1 Autopilot, used in the B-17, B-24, and B-29 bombers, Honeywell has been instrumental in helping the Armed Services solve their fly-control and stabilization problems.

Today, Honeywell supplies gyros for leading marine and aircraft programs, including the T-33, Thor, Atlas, and Titan, Project Scout and Project Mercury, the F-100 and the airborne MA-1 Fine Control System. The know-how passed through production of over 300,000 gyro enabled Honeywell to design the gyro which helped Vanguard I achieve a near-perfect orbit — so nearly perfect that experts estimate this satellite will remain in orbit up to 200 years.

You can take advantage of Honeywell's long and successful experience in the design and production of gyros and accelerometers. Honeywell offers a complete line of useful components for all applications or can manufacture specific instruments to your own design requirements.

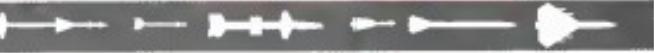
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Military Products Group

HONEYWELL OFFERS A COMPLETE LINE OF INERTIAL COMPONENTS

... to meet the needs of all applications



RATE GYROS

TYPICAL PERFORMANCE Type GR are gyro's content damping over a wide operating temperature range without the use of heaters. The repeat damping of $\pm 1\%$, $\pm 10^\circ/\text{sec}$ is obtained, without benefit of heat, from the first moment, and is available virtually constant up to -55°C . Temperature compensation is provided by a two-point trim. The GR gyro motor will rotate one, bipolar, two, or three phase power, and is mounted from ground to prevent exciting ground currents. Write to Aero Division for Bulletin M-169.

TYPE GR at "Golden Gate" is in full production in a wide variety of different models, and has been proven in space applications for the past two years. Because of its small size and low cost performance it has been successfully used in a number of manuvers as packages. Type GR is also placed for improved conversion accuracy with passive harmonic scaling. Write to Aero Division for Bulletin GRV.

TYPE M is a particularly well suited for those applications where process reliability must be combined with high performance. Unique quadrilateral sense suspensions insure high sensitivity and a wide full scale range under severe environmental conditions. The Type MRT gyro is available with heat sinks for those critical applications requiring reaction damping over the entire operating temperature range of the instrument. Write to Aero Division for Bulletin M-18 and MRT.

GG79 is a derivative of the HG-7001 rate gyro and incorporates an advanced design and design features which adapt it to many rugged applications. A high performance, high resolution, high temperature coefficient, and derivative model is available. The GG79 meets MIL-E 5172 requirements. It is available with one or two polarizations. With a single polarization, a rate switch operating at a preselected setting, rate can be selected. Write to Aero Division for Bulletin GG79.



LOW COST, GAS DRIVEN GYRO

GDRP is an expendable, low cost rate gyro using 2 stage gear drive gear. For single pole, short rate use under high shock, vibration, and extremes heat load. A cylinder of compressed air rotates the rate and measures the results within 180 microseconds after release. The GDRP can turn from 40 g/sec, decelerated to zero in 100 G over 100 microseconds. GDRP is accurate. Rugged simplicity in design provides excellent predicted reliability of 95%. Write to Aero Division.



- Full Scale Range: $\pm 100^\circ/\text{sec}/\text{rad}$
- Thermal Resistance: less than $0.01^\circ/\text{deg}/\text{watt}$
- Linearity: less than 2.1% of full scale in $\pm 10^\circ$ range, less than 3% in full range
- Damping: 2.0×10^{-6} sec. $\pm 10^\circ/\text{sec} \pm 100^\circ/\text{sec}$
- Shock and Vibration Acceleration: $100^\circ/\text{G}$
- Weight: 20.6 lb at 2000 cps
- Size: 1.7° diameter, 8.0° long
- Weight: less than 0.5 pound

- Full Scale Range: $\pm 100^\circ/\text{sec}/\text{rad}$
- Thermal Resistance: $0.01^\circ/\text{deg}/\text{watt}$
- Linearity: less than 2.1% of full scale in $\pm 10^\circ$ mode, less than 3% in full range
- Sampling: Full sampled, temperature compensated
- Shock and Vibration Acceleration: $100^\circ/\text{G}$
- Weight: 18.0 lb at 2000 cps
- Size: 1.7° diameter, 8.0° long
- Weight: 3.4 pounds

- Full Scale Range: $\pm 100^\circ/\text{sec}/\text{rad}$
- Thermal Resistance: less than $0.01^\circ/\text{deg}/\text{watt}$
- Linearity: less than 2.1% of full scale
- Damping: 2.0×10^{-6} sec. $\pm 10^\circ/\text{sec} \pm 100^\circ/\text{sec}$
- Shock and Vibration Acceleration: $100^\circ/\text{G}$
- Weight: 12.0 lb at 2000 cps
- Size: 1.7° diameter, 8.0° long
- Weight: 2.0 lbs.

- Power Requirements: 115 volts, 400 cps, single phase
- Polarization: Available at any rate from 400 micros to $10,000$ micros
- Linearity: less than 2.1% of full scale
- Sampling: 2.0×10^{-6} sec. $\pm 10^\circ/\text{sec} \pm 100^\circ/\text{sec}$
- Shock and Vibration Acceleration: $100^\circ/\text{G}$
- Weight: 1.25 lbs.
- Size: 1.7° diameter, 2.9° long
- Weight: 0.15 lbs.

- Weight: less than 100 milligrams
- Damp: 0.5° degree per radian
- Output mode: Continuous
- Linearity: less than 1.5% in $\pm 10^\circ$ degrees
- Size: 0.4° long, 2.9° diameter
- Weight: less than 0.1 lbs.

2 AXIS GYROS

GRADUATED GYRO Series 2000 is a hermetically sealed, two-axis, full function gyro. Its ultimate capability results from the mounting of a compensated 3 degrees of freedom gyro on a third series driven gimbal which maintains perpendicularity between the three gimbals during rotation and preloads both. It offers substantial savings in weight and complexity on flight control, fly-by-wire, and all other aircraft applications. The Series 2000 is designed for avionics, communications, or both. An electronic error cancellation circuit for various system permits rapid precession of all three gimbals from any position during motor warming. Write to Aero Division for Bulletin GD-200.



GRADUATED GYRO has been specifically designed to withstand the most severe environments in aircraft, avionics, or missile and space applications. Faster than 100 micros, full temperature graded construction and complete hermetic sealing combine to insure high reliability and consistent operation under extreme vibration and acceleration loads induced in missile flights. Separate test cells have proven reliable operation under shock loads up to $10,420$ G's. Write to Aero Division for Bulletin GD-200.



FLOATED GYROS

MG-100 (Minimum Enclosed Gyro) maintains small size and light weight with high accuracy. It is a single degree of freedom gyro with floatation preloaded bearings. Based on previous design and production experience with the HG-5, HG-5, and HG-200 gyro's, the MG-100 differs from them in that it is a single axis gyro, has a higher resolution, and greater precision. It is particularly applicable for use in control systems, vibration isolation, and in structure verified and sealed control systems. Write to Aero Division for Bulletin GG-100.



MG-1000 (Medium Enclosed Gyro) being only slightly larger than the standard MG-100, provides a gyro with an improved angular resolution of 40 micros. Because of its weight, size, and floatation, it is particularly adaptable to stripped down attitude reference systems, side packages, and fire control systems. The medium MG also uses a permanent magnetic torque source which allows torque rates up to $10,000$ degrees per hour. Write to Aero Division.



GG-1000 is an advanced version of the Hermetically-sealed Gyro. It is a small, highly precise gyro designed for use in aircraft, avionics, and space applications for inertial platform stabilization applications and features a permanent magnetic torque source. Performance figures, though privately classified, are available on a need-to-know basis. Write to Aero Division.



- Power requirements: Igne rated: 115 volts, 400 cps, 3-phase
- Static accuracy: ± 0.005 degrees over spread
- Dynamic accuracy: 0.05 degrees in both longitudinal and transverse axes
- Initial accuracy: ± 0.005 degrees over $\pm 10^\circ$ attitude range
- Drift rate: $0.005^\circ/\text{hr}$ or $0.005^\circ/\text{sec}$. Dynamic adjustment of ± 0.05 deg/sec
- Accuracy: 0.15° degrees in either of two vertical planes
- Size: 8.17° long, 5.1° wide, 3.2° high
- Weight: Approx. 8.1 lbs including amplifiers and power supply modules

- Power requirements: 24 volts, 600 cps, 3-phase
- Weight: less than 10 pounds
- Resolution: 0.005 degrees of rotation or $\pm 10^\circ$ deg/sec
- Frequency: 100 sec. 100 cps or 10 sec. 1000 cps
- Shock: 1000 G's without failure or damage
- Vibration: 1000 G's without failure or damage
- Accuracy: 0.05° degrees over $\pm 10^\circ$ deg/sec
- Size: 5.5° long, 4.3° wide, 4.5° high
- Weight: 4.5 lbs

- Power input: 24 volts, 400 cps, 3-phase direct and line
- Pulse width: 1 deg/ $10^\circ/\text{sec}$ from minimum resolution condition to maximum
- Resolution: 0.005° degrees over $\pm 10^\circ$ deg/sec
- Drift rate: $0.005^\circ/\text{hr}$ or $0.005^\circ/\text{sec}$
- Shock: 1000 G's without damage to housing or frame
- Size: 2.75° long, 2.1° diameter
- Weight: 0.48 lbs

- Power input: 24 volts, 400 cps, 3-phase direct and line
- Torque: 0.005 oz-inches, 400 micros/deg
- Temperature range: -100° to 100° F
- Drifted accuracy: $\pm 0.05^\circ$
- Input shaft alignment: $\pm 0.01^\circ$
- Operating temperature: $100^\circ/\text{F}$ to $100^\circ/\text{C}$
- Size: 2.6° long, 2.15° diameter
- Weight: 0.45 lbs

- **GG-1000** is a small, lightweight, hermetically-sealed rotating gyro specifically designed for use in aircraft, avionics, and space applications. It maintains the basic features of the MG-1000 gyro with significant advancements in acceleration tolerance and in acceleration sensitivity and rate. Detailed information covering the GG-1000 is planned,

For technical bulletins write to Aero Division or Space Division as indicated.

**HONEYWELL, INCORPORATED, AEROSPACE GROUP, 401 LEXINGTON STREET, BOSTON 10, MASSACHUSETTS
HONEYWELL INTERNATIONAL, AEROS DIVISION, 3300 BURGESS ROAD, JEROMEWOOD, T.D., ARKANSAS**

EDITORIAL

Russia Revisited



B.F.Goodrich

Flexible shield cuts glare in Voodoo cockpit

Without the special B.F.Goodrich Glass Shield, light from the instrument panel and radar screen would reflect off the canopy of McDonnell's night-fighting F-101B Voodoo. But with the flexible shield, light rays where a blinding. The pilot and radar observer have an unassisted glare-free view inside the plane.

During daytime flights the B.F.Goodrich Glass Shield works in reverse—absorbing the red glow of instrument panel

and sunlight. It also serves as a cosy pad in the event the plane's occupants are thrown forward.

Glass Shields are another example of B.F.Goodrich versatility in fabricating fabric-reinforced rubber products to complete shapes and performance specifications. Next time you are faced with a similar problem, talk it over with B.F.Goodrich Aviation Products, a division of The B.F.Goodrich Company, Dept. AW, 558, Akron, Ohio.

B.F.Goodrich aviation products

Recently we conducted a 6,000 mi. trip inside the Soviet Union. The occasion was the 32nd General Conference of the Federation Astronautique Internationale for which the Okhtyrko Central Aero Club of the USSR was the host. This was our second trip to Russia and occurred three years after we covered the visit of Gen. Nathan F. Twining and a group of top USAF officers to the Tushino air show and technical inspection of Red Air Force jet equipment, engines and armament factories, and military technical institutions.

As in my three previous interval journeys we found considerable change in the Russian scene. The Okhtyrko Central Aero Club had a superb job at hand for the FAI conference. Its president, Peter Starikov, was killed while gliding only a few weeks before the conference opened when the tow rope shuddered off his glider's tail. Much of the success of the conference was due to his preparations work done for the 1958 conference in Los Angeles. The club's vice president, E. N. Stavrov, who succeeded him as president, did an able job of carrying on at official conference level.

The conference also provided a fine opportunity for delegates from 30 countries to meet a large number of the Okhtyrko Central Aero Club's working members and to see them in action as returning air show staged at the Tushino gram and rose, the CIAV's headquarters. It was evident to foreign delegates that the Okhtyrko Central Aero Club plays an extremely important role in the large scale sport flying programs in gliders, helicopters, biplanes and paragliders that has been a vital part of the Soviet aviation picture in the past year. This club has also been a spearhead of advanced aeromodeling and aerobatic development in the USSR, in such varied fields as providing initial inspection for the current Soviet space program and pushing development of ornithopters and man-powered biplane at the other end of the technical spectrum.

An oasis, when the Russians are hosts at an international conference, is hospitality with lavish. Official reception by the master of Moscow, is the Moscow Supreme Soviet, by Marshal Semyon Zhukovskiy, deputy chief of Aeroflot, at the Red Army Club, by Mme Jacqueline Coletta, FAI president, at the Sovetskaya hotel, and by the Okhtyrko Central Aero Club in its Tushino clubhouse provided a unique opportunity for the U.S. and other foreign delegations to meet many of the top technicians people in Soviet aviation. Among those we personally met and talked shop with were Andron Tupolev, director of Soviet aircraft design when we first met three years earlier during Gen. Twining's visit; Aleksandr Yakovlev, whose designs became famous on helicopters, sport planes and all another jet fighters; Sergei Ilyushin, another veteran designer who became and transport designer go back to World War II and whose Il-18 turboprop transport stands today as one of the finest of its type in airline service; Nikolai Mil, the helicopter designer, whose designs and personal and accent bear striking resemblance to those of Igor Sikorsky; Mr. Ivashchenko, whose 4,000 eng. turboprop recently

went into an experimental field testing at the standard production model powerplant for the Il-18 and An-10 transports; Prof. Anatoli Kuznetsov, head of the space medicine program, and his assistant, Dr. Tatarchenko, and Col. Gen. Tolok, head of DOSAAF.

Among the architects of Aeroflot's starting point into the jet transport era we met V. V. Rokotkin, deputy chief of the long-haul section; Peter Emelichenko, operations chief of the international division; Nikolai Gorbachev, supervisor general of the international division and two graduates occupying positions that we found difficult to believe would ever exist in America: the public relations director, P. P. Soloviev, and his able and energetic deputy, Grigori Zaslavsky.

This was by far the largest gathering of top Russian aviation technical people that had met so easily and professionally with a U.S. group. Despite the fact that nobody could tell all they wanted to know, the experience was extremely valuable in filling in on many areas of aerial ignorance. This is the second time in three years that a group of top U.S. aviation people has been the guest of the Soviets and does no injustice that a Soviet group similar to the one we met at the FAI conference be invited on a reciprocal visit to the United States soon.

The semi-official objections of the State Department to such a visit should be overruled by higher authority. We hope such influential U.S. delegates to the FAI conference such as James Doakley, G. R. Smith, Dr. Elmer, Fred Crawford, Martin Deaderick and Tom Lampert will pack vigorously their expensive cameras to torment the State Department and block such a visit.

There was a strange side to the Soviet case, as there always is. While some aspects of Soviet life, particularly in consumer goods area, have vastly improved as the three year interval since our last visit, other aspects have deteriorated. Censorship and harassment of U.S. journalists seem considerably more rigid now and the characteristics of the police state are much closer to the surface, particularly outside Moscow. There is also an almost frantic official fear in the government of allowing any conflict between Soviet citizens and foreign visitors out of the restaurant, hotel and sightseeing service. This is coupled with a tremendous outdoors and violent view of things American by these Soviet citizens whenever the official turned to such contact can be witnessed.

In addition to our week in Moscow at the FAI conference we flew 6,000 mi. around the Soviet Union on Aeroflot including its latest jet transports, the Tu-104B and the Il-18. It is also typical of the changing Soviet Union that three years ago this trip would have been impossible politically as personally within the time span available to us. In the coming weeks we will report on these experiences both professionally in the aviation field and personally as an average U.S. citizen abroad in the USSR without the restrictions of official Soviet censor that imposed on all U.S. correspondents resident in Moscow.

—Robert Shute



NEW the world's biggest filament-wound fiberglass radome!

Here it is—twelve feet high, four feet in diameter—the largest filament-wound fiberglass radome ever made! This huge form was produced by a special winding process—product of Kidde engineers' knowledge and research—which results in an extremely high strength-to-weight ratio, plus a maximum in physical and electrical insulation. Furthermore, this Kidde continuous-wound process, plastic reinforced by glassfiber, permits the construction of fiberglass shapes and forms which were either difficult or impossible to fabricate by previous methods.

Walter Kidde & Company has available complete facilities and personnel for the development, testing and production of fiberglass forms. If you have a problem in this area—write Kidde today. We've solved some pretty tough ones in the last thirty years!

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FIBERGLASS FORMS ARE A KIDDE SPECIALTY!



Thanks to Kidde's continuous winding process, a new field of fiberglass forms is now open to aviation engineers. Strength and insulating properties made available can now be had at considerably less cost with half the weight!



For the engineer interested in this field of insulation, Kidde's unique filament-wound technique offers the solution to many problems. Available in capacities of from 30 to 2000 cubic inches these spheres can withstand pressures up to 1000 psi.



Kidde's socket mating cases, tank bodies and missile radomes too but a few of the forms which Kidde can fabricate from high-strength, low weight, fiberglass, available for the manufacturing industries to be had at 1000° F. for short periods of time.

WHO'S WHERE

In the Front Office

H. W. McCurdy, a division Lockheed aircraft Corp.; Wash. Mr. McCurdy is head of Lockheed's new technology, Physics, Sound Brings and Displays Co.
John M. Johnson, president, and Robert B. Chapman, III, executive vice president, Standard Avionics, Inc., Cedarville, Md.
Robert C. Schaefer, president, and chairman of the committee of project managers, United Industrial Corp., was elected board chairman.

Dr. William R. Denberg, a vice president Bell Aircraft Corp., Buffalo, N.Y. Dr. Denberg is director of engineering for the company's aircraft division.

A. Louis Pernot, vice president planning and marketing, Rocket Power, Inc., Bedford, Calif., is honorary chairman of the General Co. Also John K. Ellett, vice president of Rocket Powers Applied Research and Testing Laboratories.

Robert S. Schlesinger, vice president, Hirschfeld Industries, Buffalo, N.Y. Also Joseph A. Johnson, general manager, Blue Devil's, White Plains, Division.

Samuel G. Treskin, vice president and director of patents, Sprague Electric Co., Inc., of Sprague Prod. Corp., Great Neck, N.Y.

Robert E. Williams, Chief of the Office of Congressional Liaison, Federal Aviation Agency, Washington, D.C.

Dr. James H. Webber, Senior Scientist of the Navy Research and Development Center, Washington, D.C.

Gen. George P. Miller, recently Maj. Gen. Otto F. Melton, retiring as Deputy Surgeon General of The United States Air Force, Washington, D.C. Col. Edward J. Jenkins succeeds Gen. Galles as Director of Plans and Hospitalization Division of the Surgeon General, U.S. Air Force. Col. Jenkins is joined as Deputy Director of Plans and Hospitalization

Honors and Elections

George S. Schmitz, director of research, Boeing Aeroplane Co., has received the American Society of Mechano Engineers' Award of St. Louis Medal for 1958 for his noteworthy contributions to the aeronautical and structural mechanics in the areas of aircraft and space vehicles.

James J. Walsh, regional representative, Dallas, Okla. for Midwest Motor Power Division, Inc., has elected executive vice president of the National Association of Electrical Distributors for 1959-60.

The New York State Wing of the Air Force Am. Am. has presented its annual "Airman of the Year" to General James E. Lovelace, Jr., Director of its Research and Laboratory Division, in recognition of his outstanding research accomplishments in the areas of aviation and the welfare of the service.

William A. McClellan, Jr., manager of quality for the Allis-Chalmers Product Development Staff, Allis-Chalmers Division, has been elected chairman of the Aviation and Space Division of the American Society for Quality Control.

(Continued on page 87)

INDUSTRY OBSERVER

► Royal Canadian Air Force is considering a number of foreign aircraft to replace its present North American F-104 and Avro CF-104 (Super Sabre). McDonnell F-101, Lockheed F-104 Starfighter, Convair F-106, English Electric Lightning, and Panavia T-55 are also among the planes under consideration at the RCAF. The all-weather defense of Canada against inter-continental and command-and-control flights according to NATO is the range. Canadian government is handicapped probably because it cannot afford the Avro CF-104 due to high costs and now in need hundreds million dollars will be invested in foreign equipment built under license.

► Watch for a decision shortly on a supersonic low-altitude nuclear-powered missile in which Chance Vought's proposal is designated SLAM (AVN April 20, p. 30). North American's entry is known as Bobcat and Convair's is known as Big Stick. Projected operations would have small capability.

► New turbojet engine with very large thrust proposed by Curtis-Wright, the SE-101, has a design thrust-to-weight ratio of 10 to 1. Standard Light Mach number for the new engine is Mach 4 and better. Curtis-Wright also is studying a composite dual shaft engine, the SE-10A, for higher specific Air for the major portion of the engine passes around the ramjet section.

► Soviet Russia may launch another solar probe no later than July 9 when the craft is at its apogee (point on its orbit furthest from the sun) to make further measurements of the value of the interplanetary wind (AVN May 16, p. 66). Launching of Merkta occurred when the earth was at opposition last Jan. 2. Since U.S. scientists believe other strengths to launch probes designed to measure this basic unit of astronomical distance also have been made in the interim.

► Bell XV-1 Comicopter, still in flight testing, has not yet made an auto-rotation landing but the engineers are working out techniques toward that end. Testers now figure that 50-55 ft. will be the minimum separation required for landing, giving the plane a 1,600-ft. max. size of descent. Company and another manufacturer is designing the XV-1 for speeds up to 175 mph, their racing out and landing on wheels. Bell also has started a control for the plane, for better directional stability.

► Benga study now under way by the skeleton staff remaining at Ormond Engines, Ltd., at Malton, Ont., Can., concern the taking down of the Ingman turbojet which originally produced approximately 23,000 lb. of thrust without afterburning. Purpose is to purchase a Canadian engine for possible use in an Ingman aircraft that the Canadian government may purchase.

► Avco has dropped the subsonic version of its Niazi-Zenith automobile engine under Department of Defense contract to re-engineer the Niazi-Zenith engine as the primary source of missile defense. Originally the Niazi-Zenith missile was scheduled to come in two versions (AVN April 21, 1958, p. 27); one was designed to be launched without boosters for use against aircraft, and the other with boosters for use against incoming missiles. Niazi-Zenith missile is being developed by Douglas Aircraft with radios, computers and other source equipment under development by Western Electric.

► Hiller X-1B turboprop fighter VTOL is undergoing a final mechanical check at Moffett Field, Calif., and will be dismantled and taken to Edwards AFB, Calif., for serial flight tests.

► Lester contract for engineering and consulting work in connection with azimuthal placemats expected to be encountered with McDonnell's intra-continental ballistic missile development has been awarded to Taft-Brown & Novak, Los Angeles.

► Modified Lockheed F-104H is being used as a wing-flight experiments at Allis-Chalmers Center, Moffett Field, Calif. Modifications involve changes in oil and engine systems.



Misive and machet, nonspun, impact extruded from Alcoa Aluminum. The largest impact shows wave has 3 in. diameter, 36 in. length. Misive can make them as large as 12 in. diameter, 60 in. length. The impacts shown use aluminum alloys 1100, 6061-T6, 2024-T4 and 7075-T6.

WHAT'S NEW IN ALCOA IMPACTS?

IN A FIELD as revolutionary, promising and relatively new as impact extrusion, you'd expect progress to be made rapidly. And it has. In the years since Alcoa pioneered this breakthrough in the metal-working arts, the impact process has been advanced and extended to cover a wide variety of shapes and forms and special applications. To cut costs in-dustries of every...and to produce, in the work of an eye, complex components with tolerances down to .005 in.

SUCH OF THE IMPACTS shown above in production. Each represents at least one complexity that formerly

would have posed a real production headache; each achieves the optimum properties of its particular part.

TOUGH COST? With few exceptions, the cost of impact tooling is substantially less than for other fabricating processes. This is especially true when the length of the part would require several steps by other processes—but with the impact process, even extremely long parts can be produced with just one set of tools and one operation, simply by varying the size of the original block or slug.

IN SUMMARY, it's an excellent idea to

consider virtually any closed-end or tubular design as an Alcoa® Impact. For more specific information, and for on-the-spot assistance, the best procedure is to contact your nearby Alcoa sales office. Or, if you prefer, write to: Aluminum Company of America, 2000-T, Alcoa Building, Pittsburgh 23, Pa.

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Toronto, Ont., Canada

Washington Roundup

Nuclear Plane Setback

Joint Congressional Committee on Atomic Energy once again is scheduling public hearings—probably in the third week in July—on the aircraft nuclear propulsion program which, at about \$1 billion, has been passed out since the end of World War II.

The move seems especially premature now last week, at which Thomas S. Gates, Dept. of Defense, and Dr. Ernest York, Defense Department's director of research and engineering, said it "completely" clear:

- That the Administration has abandoned an "early" program which would reach a testing for wind with a prototype aircraft to house the nuclear reactor in the development stage at the earliest. One point of concern: Senator George McGovern, Chairman of the Senate Committee on Armed Services, is Chairman of General Dynamics Corp.
- That there will be a major shift in emphasis from the nuclear propulsion service now in an initial development, to research and development on new materials and reactors for a more advanced system.

Committee members, led by Rep. Nelson Price (D-Ga.), chairman of the subcommittee on research and development, who have persistently advocated a program to put a nuclear-powered plane in the air, scheduled public hearings in February (AVW Feb. 16 p. 32). These were postponed when further studies and hearings indicated that the late Defense Secretary of Defense Donald Quarles was in the middle of reviewing an accelerated ANP program on the part of his department. Price and his committee then advised the Administration to concentrate on new materials and "stop-hoarding" their status quo.

Now has publicly endorsed the Air Force project at General Electric which makes the short air cycle aircraft. Now, as working on an interim cycle reactor with Pratt & Whitney Division of United Aircraft Corp. Vice Adm. L. T. Howard, director of naval space programs for development, recently told the House Appropriations Committee, the USAF's ANP program is "a major effort in law and to run a test flight program which is a unique program with little logic at present." Price wants the Navy project, as well as the USAF "By early" program, pushed.

Open Competition Policy

Bridges will seek legal clarification of Air Force policy on weapon systems cost bidding following a USAF decision here last week that Douglas Aircraft Co. need bid an open competition to select an aircraft contractor to supply guidance and control for its re-launched ballistic missile, the WSMR. Douglas' original winning proposal (AVW Mar. 24 p. 34) included preparation, guidance, and control concepts which it and General Electric had worked out through months of joint effort prior to the bid and General Electric was excluded as a source of guidance and control in the Douglas proposal. Now the Air Force has told Douglas that it will accept GE in this role under a source selection competition.

Flight Proficiency Costs

Department of Defense is pushing a proposal to cut the overall cost of military proficiency flying by cutting the size of current anti-simulation and maintenance of the aircraft. Officers who have had flying status for 20

years or more could continue to draw flight pay without performing regular flight training. This also would be true of officers assigned outside the U.S. or to Alaska where it is impractical to participate in flight activities.

NASA Scrutiny

Contract and cost-cutting procedures of the National Aeronautics and Space Administration are going to be examined by the House Committee on Science and Astronautics, according to Rep. Preston Brooks (D-La.) chairman. Brooks added that one study, in conjunction with the U.S. Comptroller General, already under way was being conducted by NASA contract with the Rockwell Division of North American Aviation, Inc., for development of a \$3 million B-70 thrust engine.

Travel Tax Repeal

Supporters of proposals to eliminate the 10% tax on travel are not too optimistic over the possibility of favorable congressional action during the current session, despite the fact the Senate will again approve repeal. The strong stand taken by the House last year blocked attempts to repeal the travel tax, although a compromise Congress did adopt elimination of the 10% tax on cargo. Even though the House is not so strongly committed this session and might possibly approve the measure, public support for repeal has not been evenly strong, thereby aiding in its chances.

Transportation Policy Probe

Senate Committee on Commerce could probably be expected to propose legislation to deregulate truck, Air Freight, and Federal air transportation associations—reputing railroads, truckers, motor carriers, brokers, freight forwarders and various operation firms. Backed up to recommend a amendment to participate in the investigation, SIA's last look had not yet decided on its representation. The trade, which has already been valued at \$70,000, would review the scope of government rules toward the various types of transport and conclude the question of membership of one form of transportation.

CAB Denies Discounts

Airline airline industry's bid to allow reduced rates on regularly scheduled flights to authorized road agents has been rejected by the Civil Aeronautics Board. The industry does not want to bid off all of the total capacity, which calls for a 50% discount on standard fares, while the Board has stood consistently against such a proposal, insisting that the discounts which may be bid below the new fare setting will be bid open. For example, the industry has suggested to the agency greater freedom in bidding which the board will be offering, and to furnish the exact fares that will be applicable under the reduction either than an armchair's percentage figure. Airlines are anxious to extend the discount advantages to hotel agents certified by the Air Traffic Conference because of the growing amount of business these agents are generating through the U.S. for the industry.

—Washington staff

ARPA Pushes Communications Satellite

Industry is briefed by USAF on near-crash project; some doubt if enough development time is allowed.

Washington—Large group of prospective industry bidders was given a kick-starting briefing last week on a research program for the first projected polar-orbit communications satellite.

Possessing contradictions in the program appear to center around the large total expenditure which probably will be required to put the first polar repeater satellite into orbit and the timetable tentatively set to accomplish this. Target date ever be at odds as near month now, considered by many of the industry members as being too early to ready all the necessary techniques and developments.

The polar repeater will be the last in a series of three vehicles leading to the establishment of a real polar communications satellite with 22,000 channels, similar to a previous version now in orbit. Capable government agency is the Advanced Research Projects Agency, making through Air Force's R&D Materiel Division, with Air Materiel Command's Ballistic Missile Center functioning as the procurement agency, as it stands in BMID contract papers.

Briefing Detail

Detailed phases in the three-step overall plan begin with the communications satellite that was the subject of the briefing at BMID headquarters at Ingleside, Calif.

• Polar-orbit communications satellite, with no less than 22,000 channels, will be the first vehicle for the system. It will be manufactured by the Pacific Missile Range, which includes Loral's site at Strategic Air Command's Vandenberg AFB, and the adjacent Navy 26-Apollo launch sites.

• Second phase vehicle also is scheduled

- Nortel Corp.
- Northrop Mfg. Co.
- Boeing Aviation Corp.
- Grumman Aircraft Engineering Corp.
- Hughes Aircraft Co.
- Lockheed Missle and Space Divs.
- Minneapolis-Honeywell Regulator Co.
- The Martin Co.
- McDonnell Aircraft Corp.
- Pratt & Whitney Aircraft

Strategic Air Command representatives also were present. SAC has a distinct interest in a polar communications satellite because Airborne space plane candidates frequently disrupt high-frequency radio communications which SAC handles out. Polar orbits are expected to solve such high frequency difficulties, according to Air Force officials (AW April 27, p. 23).

• Third phase vehicle will be the launching platform, reported officials previously based 22,000 m above the earth. Three of these vehicles reportedly are in orbit in conjunction with four or five polar-orbit vehicles, could provide worldwide communications.

No specific number of stages will be selected in assembling the three-phase plan.

Conversely, San Diego Division of General Dynamics Corp. will have responsibility for assembling the complete preposition package, which is projected to cost \$1.5 billion. The package will include the Space Administration's Project Gemini, consisting of Convair's Atlas rocket, launched with Pratt & Whitney's liquid hydrogen fuel engine for the second stage. Test programs for the new upper engine has been scrubbed at White Sands, N.M., but is scheduled at White Park Beach, Fla.

• Main concern

Publishing briefings by the several communications satellite effort was concerned in the area with the specification or payload, which would include the communications platform, its power supply, attitude control and associated items.

Companies which attended the pre-bidding briefing session included:

- Convair's Aerospace Division,
- Choice Weight Aerostrat, Inc.
- Douglas Aircraft Co., Inc.
- Corliss-Wright Corp.
- General Electric Co.
- Goodrich Aircraft Corp.
- Iraing Airplane Co.
- Bell Aerospace Corp.
- Aero Mfg. Corp.
- Aerospace Systems, Inc.
- Washington Electric Corp.
- Sperry-Rand Corp.
- Republic Aviation Corp.
- North American Aviation, Inc.

Comments made by the industry leaders after posing the question included the following:

- "There is no way to get the job done in the time frame specified."
- "The cost of the program is prohibitive."
- "It is not clear what the mission requirements are."
- "The cost of the program is prohibitive."



Re-Entry Test Vehicle

Initial stages of test flight for post-Strategic Activities and Space Administration and Advanced Research Projects Agency study of reentry physics test. Headed by John Lee and James Houston, last stage of a spherical rocket motor housed in a stage adapter. First two stages boost rocket to peak altitude of about 200 m, after a coasting period the vehicle is propelled outward at speeds of 300 m/sec.

• During the four-stage test, data was collected on 335 channels for plasma in the reactor and the test cell. Temperature measurements occupied 101 channels of the data transmission system.

Gamma radiation served as the reactor coolant and dissolved in the rocket propellant fluid in the upward-pointing nozzle. The reactor was shut down briefly when puffs of smoke in the column reduced propellant flow. However, the test still concluded the nozzle probably came from overheated insulation on wrong side of the reactor and the test was resumed after 10 min. No further trouble indications were seen. No indication of the hydrogen exhaust in the outside air was to be

expected because of the low density of the hydrogen after passing through the nozzle.

Two test flights Motta B-57B missiles were used, both from the test center at Edwards AFB, Calif., for the reactor at 100 sec. The 100 ft. test altitude radiation was expected to be high grade. Induced reentry velocity and orientation of reentry vehicle of 60 degrees throughout the flight.

Senate Considers \$455 Million For ARPA Military Space Plans

By Fred Eastman

Washington—Budget requests amounting to \$155 million for the Advanced Research Projects Agency to carry on military space projects for Fiscal 1980 were under consideration by the Senate Defense Appropriations subcommittee last week.

Of that total, \$15 million was added for solid-propellant chemist, \$125.1 million for missiles and related equipment, \$40.7 million for military space technology and \$1.4 million for programs wide management and support, executive and legislative direction (AW Jan. 26, p. 35).

The \$15 million added for solid-propellant chemist represents an increase of \$1.7 million for Fiscal 1980. The overall objective of the program is the division of our interests and the development of practical methods of via them and the knowledge required to utilize the materials in highly efficient solid propellents. One major aspect of the program also is the supporting of the development of materials and propellants when they become available.

The total objective, ARPA said, is to make available for development applications solid propellents and the techniques for using them, having specific capacities at least 10 to 20% higher than others now in development.

Other details of the Fiscal 1980 budget may be ARPA, as outlined by the Senate National Activities and Space Administration authorization and committee report:

- Missile flight phenomena—\$41.6 million is compared with \$25 million for Fiscal 1979. The program calls for hard target tests and soft-surface impact tests and studies.
- Missile and satellite identification and kill—\$17.6 million is compared with \$10 million for Fiscal 1979. Work in this area is designed to lead to the development of a variety of passive identification devices, a tracking device distinguished from other objects which may be flying with the satellite.

- Missile aerodynamics, tracking and data collection—\$35.2 million is compared with \$25 million for Fiscal 1979. Major area of study is that of hot atmospheric reentry of various types of reentry data for point intercept assignment and analysis of data of reentry for dealing along with the related tasks of instrumentation and coordinate transformation of data throughout the flight defense system.

- Reliability investigations and explosives research—\$30.6 million is com-

pared with \$22 million for Fiscal 1979. Included these investigations and research projects will be looking for major improvements in reliability, testing techniques and equipment.

• Space transportation programs—\$100 million is compared with \$75 million for Fiscal 1979. This includes extensive environmental testing of the structure and determining compatibility with the ground-based launch and return to obtain the reliable required for long life unreduced payloads.

• Communications—\$11.6 million is compared with \$15 million for Fiscal 1979. Most promising appears to be the use of space satellites in remote deserts, ARPA and (See, later page).

• Precision navigation—\$12.2 million is compared with \$14 million for Fiscal 1979. Purpose of this program is to explore the feasibility of using satellites orbiting at greater or previous orbital altitudes such as geostationary.

• Very early warning program—\$18 million is compared with \$12 million for Fiscal 1979. Work is continuing on the development of satellite-received early warning, including flight testing. Studies are included to determine the ability separately of sensors and shielding, if any, for certain tasks.

• Electronics program—\$60 million is compared with \$30 million for Fiscal 1979. The program includes engineering prototype flight tests to evaluate performance of image components, and subsystems of vehicles. Another phase of the program is the biomedical sciences, capacity program designed to monitor living organisms from orbital flight.

• Microscale flight phenomena—\$41.6 million is compared with \$10 million for Fiscal 1979. The program calls for hard target tests and soft-surface impact tests and studies.

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• Reliability investigations and explosives research—\$30.6 million is com-

Soviet Exhibition

Display exploring Soviet work in exploring atomic energy, surface and electronics will be featured in a Soviet exhibition which will open in the New York City Coliseum June 30 for 40 days. Major Soviet scientific instruments of all types, duplicate models of their Soviet satellites and their communications, working models of a thermonuclear plant, precision testing equipment and models of the T-100 helocopter and Tu-144 and An-225 aircraft will be displayed. Other exhibits include models of the Soviet space station, electric power generation systems including hydro, thermal and solar power generating stations, explanation of the atomic Soviet space station, and four types of Russian automobiles among the 20,000 exhibits at the exhibition.



EIGHT HUNTERS pull out of formation during board-burn at the Duft air show. Remaining in mode several past, pull up and over into headwind and break out for landing.

French and British Teams Star at Paris

By David A. Andolfatto

Pens-Syretzsky demonstrated his Swedish Sub-Division and none responded living in French and British areas to me used this 2nd International Automobile Salon from being put anything on there.

Both days of the flag display were marked by short stops ground loops and transients as aircraft arrived at Langley Airport. Weather kept USAF activity to a minimum. Clinton, Texas, including the Convair F-102A all weather fighter, withdrew from the show on the second day after being struck by lightning.

But the French and the British scrubbed away the last few bad days, saving the

lighter. These contrasts draw attention and clarity from the edited crowd.

One-Upping Tunley
André Tropine, son of René, who
spent most of the time the
plane of the Past at the rear, taking the
engines and being photographed. At
the Biarritz meet he mixed with com-
pany that included engineer George
Schaefer. Trying to get up on the
Biarritz, Schaefer told Tropine that his
new engine was turning in one out of a
Mitsubishi 13. Tropine then had him sit on
the floor with an expression of enormous
annoyance and disgust and declared:
"You will have my aircraft!"

uniformly, by Selson Oberholser, showed extreme high-speed turns available and one of the highest approach patterns observed by an aircraft pilot-trained at the school. Rate of roll was very high, turns were very tight, and the highest speed turns were the instant of the landing. Oberholser demonstrated some of the greatest landing characteristics of the monoplane, but also his lack of comprehension as a pilot.

For the arrival, Major Bass was loaned the 11B by Captain Elmer B. Danner, Major, USAS, 4th division. On the first flight that this machine was staged at the meet, and they were performing at some distance from the field. But the second day they tightened up healthfully, and produced one of the most spectacular bombardments ever seen at an airshow.



HIRE HAWEER HUNTERS from RCAF 111 Squadron formed one of the groups invited by the unit for the Salter Flying Display. A group of Bee Hunters circled at 10,000 feet over the field, providing short, nonstop aerobatics before a planned landing.

The team used red, white and blue markers to trace their patterns in the soil. At the final observation, three students held a right-angle marker leaving a red, white and blue crosshair. The same team team, which had given the name portion of the airship name, looped ratio that, consisting of the top into a bomb burst which carried the molecular of France in all directions to the horizon.

Royal Air Force 111 Squadron fielded the entire unit in two hours of two and five Hawker Hunter Mk. 6 day fighters respectively. Technically, the squadrons flew better than the French formations were a little higher, piloted a little more precise. But the French not even with showmanship.

British Terms

Use of the two planes by 111 Squadron kept one group ahead at front of the crowd. At 12.15 Blackstone was lined up as the observer and took off in his group, the twin men and one big man. Below the first group was its turn, then they had the wing alignment and were heading back at the field to begin the demonstration. In motion change were well handled, and each plane or biplane was gap visible as the planes passed by.

This bond-burst conclusion was a variation on the lone theory. The first train of nine dig a downward burst streaking all across 40 dig for the lion. From this winds pattern moved the remaining flight to do an upward, bond-burst through the front of the lion. Bond was passed at the field while made by the enter formation of 18 flying a shallow V with 20 in the low. They hopped up and over who another bond burst, with the outside nine going up, and then the remaining four



THE BASSAULT MYSTERE AA der fighters from the 11th Wing at Dijon from a height of 10,000 ft. during one pass of their aerobatic machine. Photo was taken with camera of French, red, white and blue smoke in wavy patterns in the sky.



DASSAULT MIRAGE 3 with SEPR vector park for stability, power dissipation and vertical climb and fast turns.



NORD GRIFFON lifts off rapidly for high speed runs.



TALBOT HAWK SEAGLASS, Denmark: Elledion's 104 prototype comes in for landing. Swedish Saab-Dornier (below) also has a history to begin test individual performance of entire Pan class. Photo by Stylen Olofsson, the little double-decked aircraft soaring maneuverability at high speed.



completed a second loop and horizontal pass.

Both teams fed alternately from left and right into the landing pattern, with Hunter coming in over the threshold about six seconds apart.

Another highlight of the flying display was the familiar hot-stacks exchange landing, featuring the English Electric P.115. R. P. Beaumont, chief pilot for the company, took a short ladder from an older demonstration pilot and then held tight until well within the sight of the crowd. "He's a good pilot," said one participant, and the landing seemed to have been easy. The P.115 was always in front of the crowd, and the 1g burn added verisimilitude to a burst of afterburner power showed the remarkable maneuverability of that plane at extremely low altitude.

USAF Participants

USAF fielded the Cessna aircraft North American F-100s in the Skysilver team, sailing their F-100s and F-104 Starfighters and the crew of the McDonnell F-4C and Canadair CF-102A and Lockheed F-104G. Short's representation of the lot was the RF-104, which beat off the honors of a feature act of dash and handled well in high-speed passes. The F-102 was a well-worn veterans' assignment, usually to Barber AFB in Colorado, by way of the Air Force Defense Command. The paint was peeling, and an appearance in sharp contrast to the shiny colors of the Skysilver Skimmers or Hunter.

Biggest disappointment was the Lockheed F-104G demonstration, flown by Lt. Col. James Johnson. The plane made only a buzzoff, a single flyby and a landing.

Most observers estimated the poor showing made by USAF on the second day of the display. Whether that was undoubtedly a factor, but it didn't seem to bother anybody else who attended the demonstration. And on the field the second day, Antennas observers were hoping that the F-104 would make a blistering run to get the Dornier, Mikoyan and even the aging Hawker Hunter in their proper places. But it never happened.

The flying display was scheduled by timetable, instead of as based solely on the number of aircraft present. Despite the display, the left a guy of mixed interests down which nothing happened. To fill the time gap, however, in the withdrawal of the USAF on the second day, a pair Douglas C-117s flew repeatedly past the crowd. By about the fifth pass, it was getting rather monotonous.

Many people at the show criticized the timing and felt that too much had been scheduled. Displays began at 10 a.m. with light planes, and landed mid-

7 p.m., with time out for lunch.

Traffic control left something to be desired with some of the pilots. French ex-Bill Bedford, flying a Hawker transport aircraft, was reprimanded by the wing master for a high-speed pass which he did beautifully but on the far trajectory.

B-1B Impressive

Russians flew the Tu-104 and the B-1B. The Russian design impressed everybody with its silent takeoff, its turns from during the takeoff and the gentle landing. Tapolev's big Tu-104 didn't. The Russians said that there wasn't a trailer big enough to drag it from the parking area to the space that when the plane landed at Le Bourget, a shadowed trailer moved it onto the parking area.

The Tu-104 was finished with fatigue cracks, shipped with bullet holes in



DASSAULT COMMANDANTE a light transport also available as attack aircraft with heavy armament. Later version is called Spad.



ITALIAN AGUSTA A.12-E helicopter prototype. Plane has been ordered in quantities quantities for Italian Air Force as executive transport.



BREGUET INTERSUD T400 demonstrator STOL characteristics of Le Bourget. Miss Hélène Sager Rossmann (below) freefall and low altitude, turns up to 25 g-force.



Total number of test flights was 1,070,000.

Respects per test mile were three miles to 15 loops. Direct approach and landing were 10 miles to 15 loops. Low altitude turns were 10 miles to 15 loops. Net pitch was 42 loops per test hour, which is equivalent to about 61 loops per test mile.



RUSSIAN ILYUSHIN 18 (top) going transport, in Azurair markings, lifts quickly off the runway to begin its demonstration. Below: Impressed observers with the high quality of workmanship, class lines and strict precision.

both ends. Building due to last several months at its peak at its nadir, and there was some pessimism at the start on the intended shuttle service, probably due to a hard landing somewhere.

The French showed the Nord Céleste in flight under ramjet power. This quiet-looking prototype, developed in one quiet corner to accommodate the jet's extreme altitude, beat nearly the record of its sire. The smaller but far cuter, as it was for easier interesting and worthwhile

French developments. Dassault fielded a trio of Mirage 5 interceptors for a wide variety of flight demonstrations, including the fastest sailing was at the show. One of the Mirages had an auxiliary rocket powerplant for augmented performance at high altitude. The company's Mirage 4 prototype, hobbled in French standard baulk bar, was only less than half the size of the final version needed to do the job, so it could fly a single pass over the field on the first day of the show.

NATO Establishes Hawk Agency

First-flight agreement has been signed between the NATO commandant of aviation forces for the holding of the U.S.-Boeing Hawk air-defense missile.

A new NATO agency, known as the Hawk Production Organisation, has been created to supersede the coordinated production program. Although the allied NATO commandant can give few details, reportedly the five European nations—Belgium, France, Germany, Italy, and the Netherlands—will spend about \$480 million of their own defense funds to build the Hawk (AW April 6, p. 36).

Informed sources say 22 Hawk battalions are involved in the program, with initial deliveries slated to begin in 1965.

The Hawk program marks the first venture of U.S. allies established at the 1957 NATO summit conference. At that session, President Eisenhower promised NATO nations the U.S. would help establish in Europe large scale production of advanced type miss-

iles. NATCO's commandant on the agreement stated that the Hawk production deal will serve as the general basis for further joint work within NATO to facilitate the early and efficient production of modern interceptors.

Besides the Hawk program, negotiations currently are in the advanced stage between the U.S. and several NATO nations concerning European construction of the Phalanx Side-winder air-to-air missile.

NATO and U.S. sources in Paris believe to give my knowledge on how the Hawk battalions would be distributed among the five nations. It is believed West Germany will get nine battalions, Italy, five, and France, Belgium and Holland, each.

Intend, France had indicated it wanted to retain battalions but later stated that figure does not reflect because of budgetary considerations. Some observers, however, feel the present 22 battalion program may go as high as 30. This would happen if the U.S. decides to place offshore orders for the Hawk

Time is running short for the Hawk to meet its 1965 debut.

Titan ICBM Division

Bellanca-McDonnell Co. has formed its Atmospheric Division to help U.S.A.F.'s Titan Missiles Division generate operational support for the "Titan" intercontinental ballistic missile. Principal responsibility will be to administer and coordinate work of all Titan missile contractors to ensure operational stability at the earliest possible time. First job will be at the Titan training area at Vandenberg AFB, Calif., to be followed by test operational bases near Loring AFB, Colo.; Ellsworth AFB, S.D.; Minot Air Force Base, N.D., and Elmendorf AFB, Alaska. General manager of the new division will be Vernon R. Brown, former director of manufacturing for the Bellanca Division.

This is a unique development in that

New York Fights for More Defense Jobs

By Katharine Johnson

Washington—Controversy between the powerful 44-member New York congressional delegation and California congressional delegations is heightening over shifting aircraft and aircraft business from the West to the eastern coast at state unemployment.

"For every dollar contributed by the California taxpayer to put the cost of the defense procurement programs, the state gets back \$2.78 as defense contracts," Sen. Kenneth Keating (R-N.Y.) told the Senate last week. "For every dollar contributed by the New York taxpayers, New York state gets back in defense work, a paltry 6 cents. It is evident apparent that the situation with California is completely upside with the states' taxpayers."

On the issue of the continuation of a big aircraft plant in New York, the New York delegation which would expire that

■ If contracts are negotiated, the negotiations must be conducted "equally with men or state firms."

■ An equal opportunity must be given to the citizens to review those proposals.

■ If the award is not made in the low bidder, an explanation must be given to him in an open court.

■ Specifications should be stated in the simplest manner possible, and whenever possible in terms of "performance" rather than in terms of design and manufacturing details.

■ A "fair share" of contracts go to small business concerns and to concern based in areas of labor surplus.

■ Contracts given in different areas of the country to strategic areas and to запади from whom relatively smaller proportions of projects have been awarded.

The New Yorkers view the measure as paving the way for "interior" assignments in military procurement—without in any way reducing work efficiency or effectiveness. In buying contract letting out into the open and increasing competition in negotiation," Sen. Keating explained that "all we ask is that no nation gain a fair break—including New York."

Calmly, Sen. George Smathers (D-S.C.) declared: "I think the Senate has done a good job."

Sen. George Smathers (D-S.C.) declared: "I think the Senate has done a good job."

California's economic moment of defense contracts.

Chairman Keating (R-Calif.) declared that it is understandable—but untrue that our southern partners, supporting unnecessary burdens upon defense contractors against us at this time—when we are rapidly approaching the time when the missile gap between the U.S. and the USSR will reach the greatest critical point. The only relevant criteria in awarding advanced weapon contracts at this time remain the capability of the company to group committed to do the job needed in the shortest possible time."

California's share of the total dollar volume of defense prime contracts has increased from 15 to 27.7% over the past eight years. New York, above, said this period declined from 15 to 11%. Sen. Frank J. Lausche (D-O.H.) commented that during the high employment Keating was period, New York firms passed up several contracts for fighter profit production contracts. "When the best time to negotiate production contracts for advanced weapons, Lausche commented, 'it was very important to deal with the California people who had had such experimental contracts and who had obtained the loans."

Tenants and New York officials are seriously working on a united campaign for defense business. Businesses are "urging their political power to assist us in this matter," said Sen. Keating. "We have talked to the trade unions and firmly told them they have

• Sen. Fred Douglas (D-H.I.) made public a bill drawn by the Department of Defense that says that 70% bonus and overtime pay for the work of civilian employees in the 100 largest contractors who receive 74% of the total defense business. The bill, not yet completed, designated 277 contractors working for seven aircraft firms Lockheed Aircraft Co., 16, Boeing Aerospace Co., 16, North American Aviation Co., 16, Douglas Aircraft Co., 16, Martin Co., 15, Beech Aircraft Corp., 14.

• Sen. Douglas and Sen. Juria introduced legislation tightening up on the hiring of James农夫 in position in which they would negotiate contracts with the military services. The measure does not deal with the more complaint of violation of Congress that the administration and Congress have only recently agreed to a limit of \$100 million which hold management as policy goes to waste. Commenting that the President believes "political and financial pressure may be brought to bear on defense contractors," Lausche said his measure is to effect "a reasonable confidence in military procurement activities."

• Senate unanimously approved a three-year extension of the reorganization law without significant change. Now at issue before a joint conference committee are these two major differences between the House-passed and the Senate-passed version of the law: the Senate version is an extension of defense procurement to the House and Senate Armed Services Committees, possibly to be followed by an extensive investigation of reorganization in the Joint Committee on National Defense (AW June 23, p. 35) is proposed for in the Senate version; the House version maintains committee jurisdiction (AW May 15, p. 35) while Rep. Cal Venable (D-Ga.), chairman of House Armed Services Committee, has changed his position to support the Senate's plan.

French Order H-34s, H-21s

Paris—French government, because of urgent and intensive operational needs in Algeria, has decided to purchase additional quantities of heavy helicopters in the United States.

According to the new order on 27 helicopters, plus spares, at a total cost of some \$17 million, The French are known will get 20 Sikorsky H-34s while the French army will take eight additional YH-12As.

To get the new orders, the French government abandoned other types of armament until final confirmation of a new information. The National Assembly approved the government's request to double the credit transfer, despite the fact that some military observers feel the French already have more heavy helicopters in Algeria than can be used efficiently.

Prior to the new order, the French had placed orders, now largely filled, for 71 Sikorsky and 100 Vertol helicopters. In addition, 100 military helicopters are being built under license in France by Sud Aviation. Of this batch, 46 have been delivered. Thus far, at the end of June, the French are operating a fleet of 221 heavy helicopters, most of which are involved in the Algerian conflict.

Despite such deliveries, the Algerian conflict consumed resources and will have only 180 heavy helicopters available by year-end. The next are needed in training or have been killed out of service in combat. To meet pressing needs in Algeria, the 27 helicopters ordered were divided between Sikorsky and Vertol as the total order could be delivered during July.

Assuming debate brought out one reason why the French government had to spend previous dollars on American helicopters after originally placing its 150 Sikorsky order with the Americans, the government justified the figure last April as follows: "In 1957, the date when the decree was issued, the market was 100 percent American."

As a result, the French production rate on the Sikorsky design is 2 to 3 times less.

The company expects to let five per month again in October, then go up to 10 by July 1960. But meantime, to meet urgent demands by the French military in Algeria, the government was obliged to turn to U.S. manufacturers.

West Germans to Design Weapons

Bonn—Defense Minister Tuncalı Tuncalı Straus and the third phase of the Luftwaffe building will be marked by introduction of German-designed equipment, in a speech by the German Aircraft Industry Association at Berlin's Grueningen Airport to 100 foreign officials, a 10-ton helicopter and a medium aircraft part of probable projects.

The minister emphasized that the third phase, which is not yet begun, was to assist in the development of all other members of NATO. The old idea that German soldiers must be trained only with German weapons is past, he declared.

In contrast, his speech to the assembly a year ago (AVW June 9, 1958, p. 25), Straus said, on starting rearmament, He explained that the first phase of Luftwaffe buildup relied on receipt of purchase of F 80s P 51s Sabre. He had no practically finished He and the second phase, now under way, would center on the purchase and future production of the Lockheed F-104 and Fiat G-91.

Straus and the budget committee of the Bonn-based defense home are discussing an appeal to the government for better behavior of the skillfully paid German contractors of these two models.

The Defense Ministry has proposed having about 100 F-104s outright from

Comet 4 Hits Fence On Idlewild Approach

New York—A British Commercial Airway Control Station at Idlewild, Concourse 4 stopped a short level at Idlewild the last flight approach but took and not turned sharply to undercarriage and flap. No one was injured.

The Comet's pilot reportedly blamed the incident on the fence, attributing a last-minute starting of the aircraft to turbulence around the fence. The fence is all the way to Runway 25 to protect it from higher flights from jet blisters.

BAeC would not comment officially except to say that the jet had turned the fence with an starboard nose wheel and blown a tire on landing.

Vanguard Weather Satellite Shot Falls

Washington—Last week's attempt to place a 25.5 lb. weather satellite as orbital failed due to a malfunction of "off the shelf" regulator in the six and one-half of a Vanguard rocket fired at Cape Canaveral, Fla.

National Research Laboratories officials and the defense general in the helium gas regulation, which is activated upon a signal from within the rocket. Television signals received from the rocket showed that the signal was generated as intended, but that the regulator failed to activate, causing high pressure to build up and rupture the sphere.

The failure occurred 180 sec. after launch and the rocket had reached an altitude of over nine 40 km. Only two of 18 Vanguard rockets have succeeded in placing satellites in orbit. In each unsuccessful attempt, except the first failure to place a satellite in orbit has been traced in malfunction of a part or parts.

Only one more Vanguard vehicle remains in the program. It is being readied for firing in six to eight weeks when an attempt will be made to place a 25 lb. satellite in orbit.

NASA Appeals Board

Washington—Three members of the NASA Appeals Board, headed by Robert Nease and Space Administration in wife disputes arising from NASA contract, Marshall Air Force Base, Birmingham, N.Y., and Robert Nease and John Horne NASA officers. The agency last week issued a 24-page document on contract procedures, bidding and its liaison from Dowling at the NASA office 1518 H Street N.W., Washington D.C. 20004.

Following the public hearing meeting, members expressed disappointment that Straus had not spoken more explicitly about the procurement plan of the vehicles which he introduced in passing. There had also been some expectation that he would be more specific about a F-104 as transport order when the present Naval Aviation contract ran out for the northern group.

Tu-104 Permitted to Land at Idlewild

New York—Members of a Soviet trade delegation were due this week at New York International Airport in routine assault under a special dispensation from the Port of New York Authority. At the U.S. State Department's request, the Port Authority agreed to waive its requirement that none but U.S. companies below the Tu-104 is admitted to the airport. The Russian jet was turned down twice before by the Port Authority after the agency had failed to conduct some tests and had run several Soviet transports.

In granting the State Department's request, the Port Authority of simulations for operation of the Tu-104 in other civilian turbine aircraft at Idlewild. The flights shall not serve as a prototype as advanced future exports. The agency said, and the plane's maximum take-off weight already bid down for U.S. and British jet aircraft operating at the airport.

A minimum of three Russian jet or turboprop aircraft was set by the Port Authority for the current situation.

News Digest

Division is due early in July to the personnel and test corporation for Air Force contractor of Project Scout program. Convair brought for the audience contract let by NASA (AW April 27, p. 34).

Air Force has established a \$42 billion contract with Sperry Gyroscope for Boeing B-52 bomber electronic countermeasures. The first two aircraft will be delivered by July 1962. A minimum of three B-52s jet or turboprop aircraft was set by the Port Authority for the current situation.

Dr. W. Abbott has been appointed director of Astronautical and Space Research for NASA, succeeds John W. Crowley, Jr., who is moving off last June from Crowley's deputy status.

Republic Aviation Corp. will receive a \$160,000 grant environmental research by the Defense Department. In addition, RAC is to receive \$1.5M to conduct a series of standard atmospheric conditions 150 m. above sea level. Chambers will be used for human factors, materials and components testing. (See p. 47.)

Lodestar Missiles and Space Division has proposed a moderate price payload system for space vehicles with a 1 km. central cable separating the payload section from the atmospheric power supply. Systems would convert nuclear reactor's thermal energy directly to electrical energy for low-thrust, long-time applications.

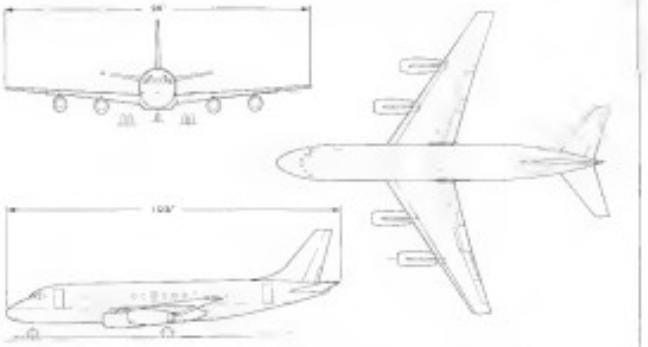
Cat Experience
NATCC and its program is based on long experience with missile programs authorized for prime award in 1957. The agency said it has been impressed until now to develop a program applicable to jets as well as piston planes because experience was lacking in scheduled jet programs.

The program also calls for training flights to be conducted at airports east of the metropolitan area, engines to be run up in certain areas and with landing equipment where possible, and landing methods to maintain 1,000 ft. as long as possible.

The Port Authority Executive Director Andrew J. Schembechler said a number of NATCC's contracts have been awarded to Lockheed and Douglas Aircraft Co. and Herbert D. Falck, chief of the Port Authority's Aviation Development Division, said a nucleus of NATCC's technical committee. Neither has been connected with NATCC for several months.

Statoil field in East Greenland surface-to-surface guided missile last week. Flying, which was successful, also was test at the guided weapon range in the Swedish Rockies.

AIR TRANSPORT



WINGSPAN of 94 ft., length of 101 ft. and tail height from ground of 34 ft. are dimensions of proposed DC-9. Douglas says the jet transport could be in service in 1965. Operating economy is equivalent of 54-passenger DC-8 for stage length up to 1,500 m.

Douglas Reveals DC-9 Performance Data

Four Pratt & Whitney turbofan JTF10A-Is will power 68-92 passenger short-medium haul airliner.

Stata Maries, Calif.-—Douglas Aircraft Co. has formally entered a four-turbine, 68-92 passenger DC-9 in the short-to-medium haul air transport competition. It could be in service in 1965.

Douglas is one of the leaders of passenger jet transports. Douglas' first jet airliner was the DC-8, introduced in 1958. Since then Douglas has sold 75 to 100 intercity transports worldwide.

The Douglas team says the new aircraft will be smaller than the DC-8, yet offer more seating, more range and more reliability. Douglas claims the new aircraft will be faster, more fuel efficient and more flexible in operation than the DC-8.

The DC-9 will carry 55 first-class passengers in three rows served by passenger-powered DC-8 principles of quick entry to that of the larger DC-8.

Aftermarket "conversion" aircraft could be used for something less than first class if the potential buyers are in good standing with Douglas.

A cadre of top production engineers is already working in cooperation with the advanced design while awaiting the word to start final engineering. Most of these men will head design groups at hub cities representing positions where the workload is engineered for prime time. Fabrikation and assembly will be centered at the Douglas Long Beach plant along with the DC-8 to take ad-

vantage of some interchangeability existing and to take up some of the slack when DC-8 production begins off the start until a normal load is reached.

Feeding can be shared most notably among the two and four-turbine versions which is identical in the two planes. A distinctive feature of the two-stage aircraft is its simplicity.

Pratt & Whitney Aircraft JTF10A-1 is the four-turbine engine chosen. It is 5,190 lb. thrust, dry weight to 6,967 lb. This arrangement is believed to be superior in terms of thrust to capacity weight and cost, or a related subjective in several ways. Another advantage is low specific fuel consumption, about 33% less than that of auxiliary jet engines.

Span of the DC-9's wings is 94 ft., length is 101 ft. and height of the tail

wing sweep of 30 deg. and proper placement of the control and stabilizing surfaces.

DC-9 Engine Performance

Rating	Alt. ft.	Temperature	Thrust Pounds
Six level takeoff	Sea level	Std. in plus 90°	2,280
Six level takeoff	14,000	Std.	7,200
Six level takeoff	14,000	Std. plus 41°	8,980
13,000 ft. max. cont.	357	Std.	4,150
13,000 ft. max. cont.	357	Std. plus 20°	2,060

comes before those of the larger DC-8. The DC-9 has leading edge slats which are automatically extended and locked into position when flaps are deflected. These high mast devices reduce the lift-off and landing field lengths to values equal to or less than those of the DC-8.

At maximum takeoff weight the aircraft will climb at 1,000 ft/min. per initial climb a distance of 3,160 ft. at a point-to-point speed of more than 550 mph. Additional range is available at a slight reduction in speed. At shorter range the climbing speed is over 580 mph. Normal cruising altitude will be up to 30,000 ft.

Severe structural loading weight is 10,000 lb. greater than the actual landing weight with a first-class cabin and normal fuel reserve, the DC-9 is able to operate under more rigorous conditions than existing aircraft at much lower weights.

Self contained stowage at the forward passenger entrance permits rapid loading and offloading at intermediate stops. Second passenger door for roll-up ramps is located at the rear of the cabin to speed ground operations at major terminals.

DC-9 will accommodate the Federal airworthiness standards for the DC-8, but about a five-turbine arrangement and five aircraft for each carrier.

Test-tube free-vortex tests are on a

Performance—68 First Class Passengers & Baggage

Range (nm.)	200	300	400	500	600	700
Takeoff weight	44,200	50,000	55,000	61,000	68,000	74,000
Takeoff weight (lb.) in the standard case	44,200	50,000	55,000	61,000	68,000	74,000
Max. takeoff length (ft.) in the standard case	4,000	4,700	5,100	5,500	5,900	6,300
Max. landing length (ft.)	4,000	4,600	4,900	5,100	5,400	5,700
Max. range (nm.)	33,000	36,000	38,000	40,000	42,000	44,000
Max. range (km.)	60,000	66,000	71,000	76,000	81,000	87,000
Passenger range (nm.)	500	600	650	700	750	800
Passenger range (km.)	900	1,100	1,200	1,300	1,400	1,500
Refuel per 100 nm. rate	1.20	1.30	1.34	1.39	1.40	1.43
Refuel per passenger rate	0.00	0.00	0.00	0.00	0.00	0.00

in patch. Transit seats are five abreast. In 92 passenger mode, Mount passenger configuration for 75 passengers is fixed interior arrangement.

First-class seating configuration has an aisle width of 27 in., and the carrier seating provides a 16 in. aisle width. The cockpit is arranged for either a three or four man crew, with space available for a fifth crewman if necessary.

Forward and aft passenger doors are 4 ft. x 72 in. and 4 ft. x 48 in. The rearward exit door is 4 ft. x 48 in. and the right-hand emergency door is 2 ft. x 48 in.

Cargo bay length is 47 ft. Cargo volume is 600 cu. ft. It is pressurized to the same values as the cabin. Forward cargo door is 4.36 x 4.14 in. and aft cargo door is 4.35 x 5.3 in.

The gross-loaded payload of the DC-9 is based on 10 lb. per cu. ft. It has a single-tiered payload of 17,150 lb. in cargo, range n. 2,700 std. in. It has a full-weight payload of 16,150 lb. in cargo, range n. 1,930 std. in.

Planned speeds for the DC-9 present high cruising speeds and simplified cockpit procedures. Cruise speed planned is a constant 450 mph excepted around up to 17,000 ft.

About 15,000 ft. planned speed is expected to meet speed capabilities at maximum range.

At 40,000 ft. range is 18,000 and 26,000 ft. true airspeed greater than 400 mph can be achieved.

Residual range capability (ability to take off and fly an additional segment on segments without refueling and to land with minimal reserves) of the DC-9 is 757 miles.

For all ranges the DC-9 offers a 1000 mph speed advantage of 200 mph over piston aircraft and 100 mph over the competing type.

Residual passenger load estimated for 1000 mph range is DC-9 about 45,667 lb. (200 ft. stage), 45,181 lb. (500 ft.), 41,000 ft. stage and 35,485 lb. for the nonstop range of 7,200 ft. In comparison, the DC-8 with a 115-passenger capacity, costs more to break even at 64 passengers (68%) on the 500-ft. stage, 47 (66.9%) on the 1,000-ft. stage or 60 (61%) on a 1,500-ft. stage.

Northeast Completes 707 Jet Lease Pact

New York-Northeast Airlines has completed a lease agreement with Trans World Airlines that will permit the carrier to introduce Boeing 707-113 aircraft on the New York-Milwaukee route in early September.

Initial operation of the leased aircraft will include one round trip flight each week. The new aircraft initially will be flown to their new route daily. TWA's flight time to meet the new flight schedule status. Winter schedules will be operated with Boeing 707-313 aircraft or derivatives of the six planes to TWA's comfort to prevent delivery schedules.

The late announcement, which includes one at TWA cross, will place Northeast well ahead of its two competitors in the midwest metropolitan area on the New York-Chicago route. Northeast will utilize its current route layout, which fits well with Pan American.

Eastern plans to start at least DC-8 turboprop service next year.

Northeast will gain its own flight crews to take over flight operations from TWA at a later date. All maintenance and overhead work will be handled by TWA.

Lease rental costs will amount to \$11.16 per metric tonne-mile based on an airport-to-airport mileage factor.

Boeing Nears T27 Decision

Boeing Airplane Co. is ordering a follow-on series leading to development of a Model 727 short range jet. Several configurations are being considered by Boeing's transport division with final design expected to be revealed soon. The airplane probably will be designed to carry 90-100 passengers. Aviation Week has learned that a possible configuration will be powered by two turbofan engines, using side-by-side mounting, similar to the configuration of the Boeing 727. Boeing also had studied three and four engine layouts.

Smith Questions Mach 2 Transport Cost

By Robert H. Cook

TUKE—Presentation of a costing target for transports of the foreseable future was requested by American Airlines President C. R. Smith during direction committee hearings here for the non-pax's new \$20 million jet maintenance and engineering center.

Answering queries on his opinion of the feasibility of Mach 2 transports, Smith advised that predicted \$21.3 billion price tags for supersonic aircraft are not aviation and the cost none-one can afford. He also questioned whether airline management would be willing to pay the necessary increased fare for such speed when they expect to move from 100 to 150 passengers per flight in less than 10 years.

Further, knowing jet speed increases, he said, we cannot afford traffic control problems which periodically affect short and medium haul operations. Traffic congestion and attendant delays derive over such routes as New York to Washington or New York to Boston produce postal-to-postal times nearly identical, regardless of the type aircraft being used, he pointed out.

"It makes no difference whether you travel between airports at 350 mph or 500, we're better off in hours; that the speed advantage is unproved," he explained.

Smaller Jets

Early operational experience with the Boeing 707-120 has shown that, while it is ideal for long range use, it is a "big airplane to 500" as medium length routes, according to the airline president. First, aircraft turnarounds will call for smaller type jets in sufficient volume to provide more frequent scheduling, he predicted.

Expected cruise speed of 575 mph for the 707-120 has proved a little too approachable, he said. American has revised flight operations documents to set up a cruise speed of about 560 mph. Daily utilization rate of around 50% by first hour due to the necessity for route changes expected during the initial phases on the aircraft and should approach a planned 70% daily utilization in the early future, Smith said. Less than half of the airline's jet flights have been on tour since the 707-120 and Lockheed Electra Interceptor service was suspended, he said, and the company still finds it has encountered lesser problems with them than on others.

Smith cited modifications to the safety inspection parts and outer wing fairings written on the Boeing 707-120 and previous changes on the Lockheed Electra as examples of early mainte-

nance problems. Another major modification to the Electra, known as "Opus edition Part II," will soon get under way with a three-degree nose-up pitch change of jet engine thrust plus a change of gear lever mechanism, a modification designed to lower noise and vibration levels on the Electra (AW June 1, p. 41).

Expanding the Convair 880 fleet to handle the greater size and weight of jet aircraft has required an extensive remodeling of existing buildings and ramps, American explained. As an example, the 707-120's T1B fueling position is being moved to the rear of the aircraft to be out in kink-down ducts and each unit arm with a 6-in thick concrete base has to be reinforced with an addition 7-in of rebar.

American will follow a progressive black book of overhaul on jet engines with periodic overhauls, ranging, he expects 300-400 hr., conducted at bases in New York and Los Angeles. Aircraft will then be routed in the Transcon after 2,400 hr. for the next performance analysis. Taking into account a proper learning curve for maintenance and overhaul personnel, the first year will take about two weeks to complete the 2,400 hr. overhaul with an eventual target of only 10 days. Overhauls are designed to be done in a month's worth of 40 engines and eight jet aircraft.

Smith left Winstanley Flight 64, again, which powers the Boeing 707-120, already has completed its overhaul at Tulsa and the tenth is in progress, American said. Overhaul time is expected to average nine days. Current Federal Aviation Agency regulations call for twice as many inspections as were required on the original 707-120.

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In view of these projections at the 500 hr. mark, which American anticipates will be exceeded to 900 hr. after sufficient operational experience has accrued, American 800D-15 engines which power the Electra turboprop are overhauled by the manufacturer and leased to American.

To solve these problems, Johnson suggested that airlines strengthen the

organization and flexibility of their jet pilot training and monitor its efficiency. In particular, he urged that airlines employ a professional check pilot in place of the current position of flying instructor. Johnson also called for jet pilot selection to be based on predilection rather than personal bias.

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Smith and the other director of finance in the company say largely a matter of how the airlines go about business. "If we do a good job," he said, "we can everything we're got." Later, responding to a question on fares, he added:

"It seems to me now is a bad time to increase fares unless we have more seats than we can fill."

National will return its jet aircraft from New York with Boeing 707-120 jets leased from Pan American World Airways. Four round trips a day will be operated New York to Miami, one New York-Large and one Miami-Miami National's DC-8 will be delivered to the airline in the fall and the third in November, 1966. There Lockheed Electra has been deferred and none are due in November.

On significant result National found as dragon in night coach fare from the 500-500 fleet had been cut in half for many years was that one-third of the passengers are new people who had never had an interest in flying.

Other results included:

- * Load factor immediately jumped to 80%. It had been running 65% on

in some quarters with respect to what will happen to jetliners airplanes with the advent of jetliners. The fact that the aircraft is available, both domestic and international, where the aircraft. But pricing is conceivable and desirable. All of our return inquiries are for sale, but we intend to sit them until they are sold."

Expressing doubts as to the wisdom of using hubs at all, at the Civil Aeronautics Board consumer test session headed by the General Passenger Rate Investigation, National President George T. Baker told the New York Society of Security Analysts that National's initial East expansion—six 53510 New York-Miami night coach envoys—had been a success.

National has also CAF to approve an experimental dry-cask facility between New York and Miami of 54545 and to extend the night flight route to include Cleveland. Current monthly fare on the route is \$345. Baker said national audiences responded to 545干草。

Luckheed 104145 Super Constellation with 195 seats and full lie down could be used for the service. Baker said. A 66% load factor of 76 passengers will produce passenger revenue for the top of \$33,454. Baker said, and cargo and excess baggage will add about \$3,000 for a total of \$34,500.

Total allocated costs for this airplane, Baker said, are slightly less than \$3.4 million or \$31,000 for the New York-Miami route, leaving a \$3,000 profit per trip. That would, Baker said, net a cargo, 45 round trips per day between the two cities and if it produces a net profit of \$30,000 per day, the airline would earn a total annual profit of \$450,000.

Quarantined as it would account for the new service hub to give the 6050 load factor, Baker pointed out that \$1.5 million would cover all slot cost, except depreciation and fuel insurance and fuel insurance had to be tested whether the airplane was flying as often as the route. That anything over that loss could be applied to overhead as to profit.

"My answer to the concern expressed

night-coach flights at Monday, Tuesdays and Wednesdays."

* Domestic fares are high and low, data last year was over 15%. With the new fare, it dropped to less than 7%.

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National Fare Cut Plan Aims At Wider Markets, Piston Plane Use

New York—National Airlines is seeking to expand its experience with load factors to cultivate new markets, growing in size to broaden the profitable utilization of eight piston-engine aircraft which they are using.

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Pilots Seek Cross Seniority at National

New York—National Airlines fears the possibility of a pilot strike every new year—cross seniority in the pilot engineers' budget complaint dispute.

National's pilots considered themselves to legally file strike is the beginning of June, but National officials do not feel this is that a valid will.

The new seniority dispute was made by an Air Lines Pilots Assn. after National's pilots requested agreed to allow commercial pilot and instrument ratings as a condition for flying in yrs. It means that the engineers would be added to the bottom of the pilot seniority list and the pilots to the bottom of the engineer's list, with new employees in either group then going on at the end of the new seniority lists. The engineers have requested the proposal on the grounds that it is a proportionate share which might leave them outvoted in their own lead.

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"The president of the Air Lines Pilots Assn.," Baker said, "has been instrumental in forcing a few clauses to carry a third pilot per aircraft for what he terms 'safety seniority'—a phrase used whenever his demands are supported by logic, reason or data."

"We spin out per regulation fairly refutes the main efforts at featherbedding on the part. National operated 635,200 hr. on passenger flights between New York and Miami between Dec. 18, 1959, and May 13, 1960, with a flight deck crew consisting of captain, copilot and flight engineer, and we propose to continue with this setup. As a matter of fact, adding a third pilot to the flight crew is proposed as a type of parity by this association because the engineers have a solid majority with the Flight Engineers International Assn. which the Air Lines Pilots Assn. would like to see us to. We believe an undemocratic but not necessarily."

Baker and J. M. Rosenfeld, union executive director, refuted the association's claims, contending the flight crews in the cockpit as featherbedding. Rosenfeld referred to the fourth criterion as the "fourth-best," with the fourth best to do and not there and watch the weather." Rosenfeld said he advised management to take a strike in the event

AIRLINE OBSERVER

► Strikethroughs of 12 domestic transline routes have taken off in trailing column during the past few weeks. Last week, Pan American's trans-Pacific flight from San Francisco to Honolulu was discontinued. Last month, Pan American, Pan Am, United, Trans World, American, and Eastern all cut their trans-Pacific flights. Last month, Pan American, Pan Am, United, Trans World, American, and Eastern all cut their trans-Pacific flights. Last month, Pan American, Pan Am, United, Trans World, American, and Eastern all cut their trans-Pacific flights.

► Trans World Airlines is gearing up to meet stiff competition expected from Continental's Boeing 707-120s on the Chicago-Los Angeles route. Already a hot commodity for business, TWA has developed three aircraft operating jet service on the route, but TWA is entering Continental's territory and is planning new scheduling plans to match those of Continental. Example: Continental's midnight racing program (TWA June 18, p. 30) while TWA has used with a new motion—not midnight by present thinking, but at the ground). American Airlines also operates 707-120s Chicago-Los Angeles.

► KLM Royal Dutch Airlines has ordered four additional Douglas DC-8 freight transports powered by Pratt & Whitney JT3D turbofan engines. Order raises the carrier's total DC-8 fleet to 12. Although the original order of eight assault calls for the JT3D turbofan engines, the last plane of this group will be powered with the turboprop engines.

► Extended agreement between the U.S. and Mexico, which expires June 30, has been extended for a one year period pending further discussions scheduled later this year. Delegations from the two countries have been deadlocked for several months on such extensive issues. Mexican airlines will routes into Tucson-Phoenix, San Antonio and other intercontinental routes via the border to enhance tourist business. Tuxtla is seeking an increase in the number of tourist flights on its New York-Mexico City nonstop route.

► Although much is unguessed substantially of upcoming jet transports can be predicted, some airline officials feel that TWA's latest private announcement probably indicates more than many thought. Being relatively conservative, TWA's announcement of 100,000 B area jets are already flying. TWA will be substantially increased once more after 500 more about 70,000 ft. speed reaches Mach 3.

► British Airways has placed three-month testing in its Lockheed Electra which will operate in star-class service. Either after now is 3-2 seating to limit capacity to 78 passengers.

► Air Line Pilots Assoc. last week told the Federal Aviation Agency it could expect more correspondence on the agreement between the two groups over whether pilots should receive an increase in payoffs during flight (see p. 79). In a prepared statement, ALPA President Clarence N. Stoen and the BAAF man reply to the letter written by ALPA Administrator R. R. Garside on the subject. He asserted that Deputies had "completely ruined" the point" in trying to ALPA's original letter.

► Civil Aeronautics Board has extended existing passenger tariffs, which would expire July 31, until Dec. 31 pending a final decision in the General Passenger Fare Investigation. Hearing evidence and settling the case was timed May 27. Oral argument before the Board will be held in July, following the filing of briefs.

► British airways reported a 7.1% increase in ton-miles during the fiscal year ended Feb. 28, but available ton miles rose 12.5% over the previous year. To pull the industry load factor down three points to 55.6%. Four million passengers were carried during the year, a 5.5% gain over the previous year. Total of 3.6 billion revenue passenger miles were flown during the year, an increase of 8.5%. Freight traffic showed a 5.5% increase and mail volume declined 4.4%.

SHORTLINES

► American Airlines will begin dual nonstop Boeing 707-120 freighter passenger flights from New York to Tokyo on July 17. The new schedules will bring the total 707-120 flights to 24 daily.

► Continental Airlines flew an estimated 41.5 million revenue passenger miles during May, for an average of 38,510 per May, 1958. Continued load improvement brought ton miles one segment each, 31% to 347,000.

► Eastern Airlines, on receipt of Civil Aeronautics Board approval, now is operating dual flights in and out of Jakarta, West, and Medan, Indonesia on the carrier's round trip schedule originating in Denver, Colo., and one daily round trip service between the two cities.

► International Air Transport Assn. has announced Hawaiian Airlines' associate membership in the organization, bringing the total membership to 93-30 active and nine associate members. The IATA Clearing House in London reports a 23% first quarter increase in international airline tonnage over the first three months in 1958. Hawaiian totals \$199,326,000. Interchanges between the IATA Clearing House and the Airline Clearing House, Inc., in the U.S. and 1957 to \$1,365,000 for the first quarter period. Hawaiian Airlines has an 18% Turkish arrival. IATA joined IATA's Clearing House during the first quarter.

► Japan Air Lines has opened a new office in downtown Seattle. With 1,900 French citizens in conjunction with JAL's new direct service from Seattle to the Orient.

► Vickery Armstrong (Monterrey, Mex.) reports one of his Viscount 780 aircraft flew 1,684 mi. from Ciudad Nezahualcoyotl, in State of Mexico, to a 5,170 m.s. runway. The plane reported the aircraft still had 400 gal. of fuel, enough to take it another 900 mi. to Laredo, Texas. The plane was en route to Kuwait where it is entering service on Kuwait Airways. The Viscount aircraft was operated by British West Indian Airways.

► Western Air Lines' revenues will increase 10.3 million per year increase in 1959 at a 20-month rate, according to the company's 1958 Air Transport Statement and Management Area. The airline's 347 airplanes will receive the annual load pay-increase retroactive to May 1, 1959.



LEADERSHIP IN USAF FIGHTER-INTERCEPTOR PROPULSION

Progress Is Our Most Important Product

GENERAL ELECTRIC



Recent key reasons for the J79's outstanding operational record are the simplicity of its single stage variable stator design, high resistance to foreign object damage, unusual thrust-to-weight ratio, high altitude afterburner light-off characteristics, and ease of maintenance.

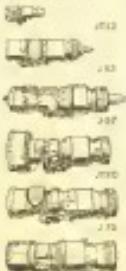
Exceeded by its J79 engine's reliability rates most corroborating today. During 1958, USAF Starfighters have been recorded an unusually high aircraft-hour rate, with a correspondingly low percentage of in-flight engine malfunctions.

1958

THE STORY OF
FLIGHT IS THE
STORY OF POWER
"PIRAT" FAMILY™
OF THE JET WORLD

From today's small
turbojet power plants
to the largest aircraft in A
irbus' Aircraft, P&W
engines are truly the
"heart" family of flight
world.

Here engines ranging
in power from 3000
to 30,000 lbs. thrust,
in true size ratio:



No other family of jet
engines has done
more for the advancement
of aircraft, both civilian
and commercial.



POWER IS THE KEY!

Aerospace has made rapid advances in its brief history. But
in recent years has more markedly increased the im-
measurably increasing speeds, altitudes and distances than
any time in man's record.

The key to this exciting progress is power - dependable
power, in forms of solutions adequate for any need.

In other words Pratt & Whitney Aircraft is continuing its

traditional role of providing dependable power for flight in
whatever form it may take. For example, we have made
significant advances in the field of nuclear aircraft power
and solid rocket components, and liquid hydrogen aircraft
applications. We are also doing extensive work on other
major projects such as variable propellant rockets, and
power for space flight.

Flight Propulsion by

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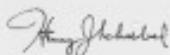


To the Men who Utilize Business Aircraft and their Chief Pilots



The Gulfstream—Grumman's new propjet corporate transport—has been certified by the Federal Aviation Agency (FAA). This first government approval of the Gulfstream as an air transport, therefore, makes available for delivery the most realistic airplane ever designed for business. The Gulfstream, conceived expressly for executive use, has every capability necessary in meeting the needs of today's business flying operations in terms of performance, utility, reliability and safety.

This 10-12-seat transport is powered by two Rolls-Royce Dart prop-jet engines already proven by millions of hours of airline operation. The Gulfstream cruises at 357 mph and has a range of 2,200 miles plus reserve. Pressurization at 25,000 feet provides a comfortable cabin altitude of 5,500 feet, permitting operation above the weather and traffic. The Gulfstream's ability to get in and out of the smaller airports vastly increases its utility and scope of operations.



Henry J. Schebel
Sales Manager
Grumman Aircraft Engineering Corporation
Bethpage • Long Island • New York



Grumman is currently producing three Gulfstreams each month and will maintain this production schedule so that twenty-seven will be in use by leading corporations by the end of this year. You are invited to

inspect the Gulfstream at one of the following distributors: Atlantic Aviation, Wilmington, Delaware; Southwest Aeromotive, Dallas, Texas; Pacific Aeromotive, Burbank, California; and Timmins Aviation, Montreal, Canada.





Brazing the trail in honeycomb fabrication

Now heating blanket brazing techniques under development at Rohr offers major advances in fabricating stainless steel honeycomb structures.

This completely new brazing philosophy for honeycomb sandwich structures offers a fast, flexible means of brazing complex configurations joined.

The new technique is a joint development of Rohr and Electrode. The principle is a high-temperature wire-melt brazing in a blanket of high temperature Rohr insulation placed next to the outer skin of the sandwich and blanket with high-temperature insulating pads to form a pack. Results of intensive tests of Rohr's new heating blanket technique prove it to be comparable to the best钎焊 techniques.



RAIL PLATE AND HEADQUARTERS: CROWN VILLE, CALIF. FLIGHT RODIRONIC, CALIF., KELWELL PLANTS: WENDELL, GA. AEROMARINE

FAA Moves to Speed Jet Traffic Flow

By E. L. Dob

Los Angeles: An analysis by the Federal Aviation Agency has found frequent traffic jams of jet transports in the Los Angeles area and suggests a good chance of being included in the two programs recommended by the Federal Aviation Agency to adopt.

The program is the result of an extensive study conducted by a team consisting of nine FAA officials and representatives from the commercial airlines, Air Force and Navy. It is designed to accelerate the flow of jet traffic and reduce the mounting similar collision hazard in the congested Los Angeles traffic control sector.

The Los Angeles area led the nation in total jet traffic in 1974. It was highest in the volume of general aviation traffic and third in carrier operations. Military air traffic comprises a significant portion of total traffic and approximately one-third of the aircraft's low-flying—including high-performance training—is conducted in Southern California.

Symptoms of the traffic situation are sharply illustrated by the fact that 17% of the nation's 164 mobile collisions which have occurred since 1974 have taken place in California. This contrasts with the 14% of the total national collisions which have occurred in the high density traffic areas throughout the nine northeastern states from Massachusetts to Virginia.

Fear Collision

Four collisions have occurred in Southern California within the past two years.

Closed cause of the traffic congestion in California stems from the widespread areas where there has been a dramatic increase in volume. About 25% of the state south of San Francisco is covered by restricted areas. High jet areas make up 75% of the entire state.

Major restricted areas in the Los Angeles sector is the roughly north of Palmdale which is restricted currently and, in some portions, at all altitudes.

High flight test areas, which overlap the restricted areas, comprise several narrow strips of corridor.

For major arrival and departure routes with the Los Angeles terminal there are available to commercial operators. These routes are concentrated in an arc of about 100 deg with major landmarks reported on the width of the routes by the flight test and restricted areas.

Moderate level restricted minimums in restricted areas up to 9,000 ft for the

long run, north 9,000 ft southwest, 9,000 ft in the north valley route, 12,000 ft northeast and 11,000 ft southward.

Traffic flow at the Los Angeles International terminal is extremely slow. The average rate of traffic through the sector that now is considered in third research parallel to the present east/west route will be opened early next year giving the Los Angeles airport an average high acceptance rate.

However, the narrow sectors along leading into the airport do not permit lateral separation of jet transports at high altitude. As a result, each aircraft must be broken through the sectors about 24,000 ft at Daggett and Hesperia—about 100 mi from Los Angeles—a single-file incoming jet will find such a point about seven miles from the airport before they begin their descent.

Traffic Jams

There are presently 28 scheduled jet flights operating daily into Los Angeles with seven more scheduled for operation by the end of the month, possibly increasing steadily until mid-year.

Efforts are continuing steadily that will take place before the year is out to relieve immediate constraints which are taken.

In addition to the projected seasonal increase in use of the problem in the Los Angeles area uncovered by a survey conducted for the FAA by the Cornell Aeronautical Laboratory.

• Review studies collision problem in southern Southern California.

• Eliminate traffic which violates high speed test flying, will be segregated into areas where the aircraft segregation criteria that previously did not fit in the area will be removed entirely by the high altitude spectrum of commercial jet transports.

• Arrange for termination of restricted areas and, to a reasonable reduction of these boundaries over time as major ramifications causing a closure of areas.

• Banished areas are poorly defined and are frequently restricted at times and areas when they are not being used for the test flight operation that led to their designation.

• Collision between hot aircraft operating within the restricted zone north of Rosamond claimed to be a significant aspect, although by Edinger, AFBB, Rosamond, Calif.

The report noted that the area has the characteristic of long section such as lack of information about future traffic and added: "A compromise must be in

variable distance between safety and incursion of sections."

• Minimize jet aircraft taking off from Palmdale into the restricted area made a particularly favorable condition since the terrain here is high speed obstacle free. The same is true between White Cloud and Palmdale.

Attempts to solve the present set unified areas conflict from Los Angeles to the northeast through the Daggett and related routes could not be reached on a proposal to establish four sectors on the route. Two sectors have been established but right-of-way through restricted areas in the area for another half mile westward was not granted to the FAA.

Lately FAA probably will report under the 25% of the instrument air traffic serving the Los Angeles terminal during the first six months of 1975 was raised during the Daggett found. When compared on the route occurred from the first to the second quarter of 1974, the Cleveland and Newark (VOR) addition of 50,000 m to the departure route.

As a result, the FAA study has suggested that the Marine Corps base could redesignate its own areas and modify training altitudes in 40 m restricted area south of the Daggett area. An intermediate smaller areas with a floor of 11,000 ft. In addition, it was suggested that the Marine restricted area could be designated as a "priority" control area with the Los Angeles or near major traffic control center as the controlling agency.

Priority Use

Under this proposal, the Los Angeles for Bell, Texas, Central Greyson would provide priority to the LA area as recommended by the Corp's training schedule. This would include high trajectory areas in the area to either side of the sector and operating up to 11,000 ft under the air way.

Most FAA representation feel that the proposal will widen the maritime areas sufficiently to permit day and evening flight operations of jet aircraft at high altitude. Airlines officials are generally in agreement and are supporting the recommendation although a small minority are still dubious over the possibility of attaining suitable day and night flights under a joint-use plan.

They point to previous attempts to expand under a joint-use effort, which have failed. However, the FAA group had that to use in its report.

"In developing the study, the FAA

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With this latest addition to its line of COMM/NAV systems, Bendix now offers you the best answer to your most exacting needs, whatever you are outfitting a light-twin or a DC-8.

The TA-21A VHF Transmitter provides 25 watts P4 output on eleven crystal-controlled channels. The RA-21A VHF Receiver provides reception on 500 crystal-controlled superheterodyne channels plus 200 additional navigation channels.

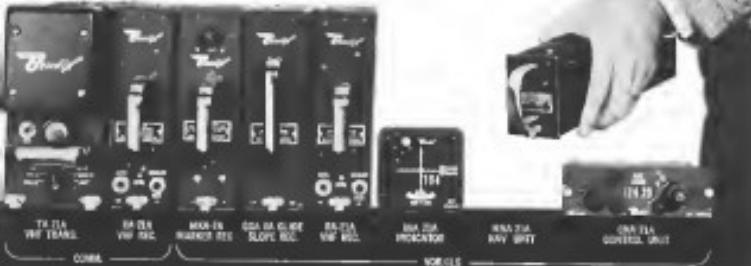
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team already considered the effect the resultant modifications would have on all of the angular rates in the entire auto. Although some instant instruction would necessarily be required on the auto-start, general and with this—the overall effect of the minor modifications will be in bringing stability in the conduct of operations before which the complete and a modification of leadership imposed on those angular rates by effect.

In its analysis of the Southern California complex, the group conducted studies of two devices designed to cut the radar clutter threat. The Nitro-oleum Priority Warning Indicator and a deflected Tacon method developed by Seven Research with a depth of detail.

The former proposed potential value in both devices but noted that "neither approach is a proper one" for the current problem in the Los Angeles area. The group noted that installation and maintenance of the equipment in all aircraft operating in the area would be "very difficult and expensive" and that time required for development, operational training and final implementation would be too long "in view of the urgency of the situation."

In its final recommendations, the group suggested that both devices be turned over to the appropriate aviation, development and experimental armories of the FAA for review to enable them to offer grants for use of the device development or other applications.

Basic Solutions

It added that radar, beacon, sonar detection and direction finding techniques replace the Matador and Searider-DeMolay projects at home and remote-area solutions in the Southern California problem.

Establishment of control ranges west and control of all airports by the FAA in the restricted area north of Palmdale-Kernersville officially is recommended and later to be expanded to cover the overlapping flight test areas No. 1—was urged by the group in its report.

Here are a few of the other recommendations set forth by the group in its study:

- Primary approach flight test areas in Southern California should be reacquired by April 1, 1961.

- Flight Test No. 1 should be assigned to the Commandant, Pacific Missile Range and its operation consolidated with the FAA. Flight test area No. 3 should be renamed and controlled by the Commandant, 13th Naval District, through coordination with the FAA.

- All anomaly monitoring or operating within the R-681 restricted area and flight test area No. 1 should be

equipped with noise barriers during flight test and training activities.

Once the northeast areas are invaded, Los Angeles should have a capability that will permit integration of point-to-point aircraft and rail transport with a minimum of spending dollars. The two railroads now in use are 770 ft apart and are 8,500 ft and 10,300 ft long.

Simultaneous landings and takeoffs from these approaches under most circumstances. To conclude, the shorter runway is to be lengthened to 10,300 ft so that all aircraft operation can be handled in this sector. The third run way, about a mile from the two present runways, will be spaced only one thousand and will be 13,000 ft in length to accommodate piston engine traffic.

A new control tower which is scheduled for completion in April, is being installed without service the new runway and the two presently operated runways. The tower cab will be divided into two separate parts. One section will control all traffic on the new runway with the second section handling traffic on the two long runways. Thus, for all practical purposes, Los Angeles' second tower, Argent will be operated at 100 percent capacity during an air traffic peak of two.

One instrument landing system (ILS) now accommodates all traffic on the two long runways. If the airport is to operate at 100 times with full under tow of all runway traffic, a second ILS will be required for the third run way.



CIVIL 192 production model of the Bristol Type 192 Autogiro, Avro's motor helicopter, here undergoing flight test for Royal Air Force, which will use the aircraft as troop and freight transport, aerial surveillance and search and rescue vehicle. The autogiro is powered by two Napier Gnome 2 gas turbine engines, producing 2,050 kg. each, at top power.

Civil 192 Helicopter Proposed

LONDON—British Aircraft has released details of its 14-passenger Type 193C twin turboshaft helicopter, a proposed twin version of the Type 192 now in production for the Royal Air Force.

Major offshoots between the civil and military versions in the 192C model—which incorporates 17 versions in addition to the emergency and civil versions—exist, however. Production also is made for total facilities and thus bigger holds with total capacity of up to 120 cu ft.

Bristol says it has held change drawings to allow modification of airframe structure to facilitate the location of refueling equipment, painted with the refueling equipment painted with the Type 192 (AW Aug 18 p 54). The

loss of the first 192C could be made early in 1961, the company said.

Starter assistance with test trials is given as 225 stat. m.s. This includes four minutes of acceleration, carrying 21 passengers at a short operating altitude of 10,000 ft. Eight seats per passenger with five passengers per seat may be carried in 136 sec. for flight less, according to estimates.

In a 17-passenger Bristol version, full payload could be carried over a static distance of 216 mi. with full reserves and allowances at a direct rate of approximately 10 crds a stat m.s. Initial estimates:

The aircraft compass axis that is

WHY THE NAVY'S NEW A3J CAN CALL ITS SHOTS IN ANY WEATHER

The AJS—built by *NASA-Goddard*—is the instant, most versatile attack plane the Navy has ever known. It can find targets at extended strike range, even if obscured by weather. AJS's accuracy comes from an extremely advanced bombing-navigation system created by *Douglas*. It's a system that is *today* and reliable today—because *Aerospatiale* started working on this field 12 years ago. This experience is available to you now. Please write for detailed information.

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A Division of North American Aviation Inc.
Downey, California

Even in total costs over a London sector at a 65% load factor, round-trip would be about \$63.50. This compares with the present first-class airfare fare of about \$18.

The lines required to bind over such 85% land are not excessive," he commented with justifiable firmness, "and represent a potential which could naturally be exploited by the government also providing a rapid service from the center station in the center of Peru with

Airlines Report Officer Salaries, Director Stock Holdings to CAB

Washington—Following is a list of each officer's salaries, bonuses and other compensation, expenses and stock holdings for the year ending Dec. 31, 1958, as reported to the Civil Aeronautics Board:

U.S. Standard Airlines. See—**U. S. AIRLINES**.

agent secretary, no salary, expenses to
be paid in principal amount of
\$2,000. A. B. Grier is principal
agent, no salary \$100 weekly and
expenses. No expenses payable to
agent secretary or agent, no salary
or expense. State Corp. Bank is principal
agent of said association.
Said agent shall receive same paid
expenses, principal amount \$100. Weekly

paid, total \$14,120. William Philp, Retired pensioner, \$1,500.
Other members, See—E. Harvard, chair of the Board and director, no salary;
John and Matilda, compensation as
trustees and 1000 shares of common
stock; F. A. H. 1000 shares of com-
mon stock and 1000 shares of common
stock; G. Banks, director and officer,
1000 shares and indirect com-
pensation as trustee and 1000 shares of
common stock; F. A. H. 1000 shares of
common stock and Matilda, 1000
shares of common stock; G. Banks,
compensation as trustee and
1000 shares of common stock.

the nonresidence of trading by
from the usual air terminals".

development of the IROC and its drug shop.

reactions at given impulse were operating weight, 18,500 lb., a cruise speed 140 mph., gross fuel load per passenger, 11.56 lb. At an average weight of 150 lb. per passenger, the aircraft would have an unladen weight of 11,000 lb. Engines specified are two Pratt & Whitney R-1830-92 Goodrich gas turbines capable of 3,600 shp each.

Police Salaries, Ratings to CAB

and 1995-1996, the average annual salary for all teachers was \$30,400, and the average annual salary for all secondary school teachers was \$31,300. The average annual salary for all secondary school teachers in Ontario was \$31,300, and the average annual salary for all secondary school teachers in the province of Quebec was \$31,300.



Martin-Mari 130-70A is now being deployed in Europe replacing the older TM-62A Matador.

Paris Missile Display Includes Blue Streak Model

Faro—The major strength of the United States' missile armament was on display at the 23d International Aeronautical Fair here. Traversing over the rest were three ballistic missiles: USAF's Convair Minuteman, and Douglas Thor, and the Army's Chrysler Redstone. Martin-Mari was shown on its hydro-launched British navy unit demonstrated English Electric Thunderbird, and Royal Air Force ground crew demonstrated the white-and-yellow Avro Rota. On the right, surrounded by the white-and-yellow Broad Arrow hoodoo. One road display (bottom, next page) showed the Blue Streak reentry vehicle. French missiles were shown, but many had already been dropped for lack of funds.



Mitsubishi rocket-booster missile (left, foreground), now discontinued, was developed by French as Nikaia-class weapon. Range claimed at 27 mi., maximum altitude at 59,000 ft., maximum speed at Mach 3.5. In background, a four-stage high-speed test vehicle for Convair's Blue Streak representative of NASA. Maximum speed at Mach 7. One of Northrop's anti-aircraft missiles (above) shows four rocket boosters provide fuel for booster charge special around Matador missile with pit-vane control for steering.

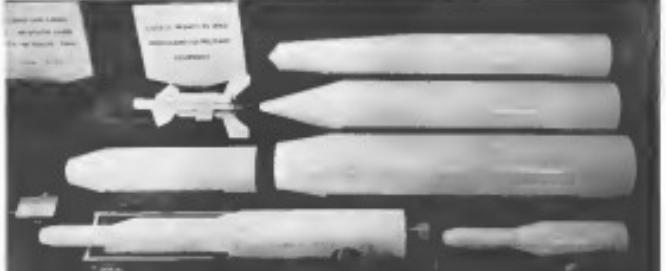
MISSILE ENGINEERING



Nord 56-10 antiaircraft missile (left) is shown in launcher mounting on truck. White sidewall tires are not field standard on this pre-towed launching unit for the Nord 55-13 tank-hunting missile.



Below: 210 Cobalt aircraft shown in modified version with launching arm mounted. Weight is 22 lb., effective range varies from 510 to 2,000 yards. Speed is 290 mph. Attaching Whirlwind Stratos missile to Red Cell-Nose has new cage-type launcher (right) tested at distributor prototype form on H-36 Canfield Nose. Landau shown will be service type. Missile models (below), illustrating load-carrying capacity of Short Range aircraft fighters, include (from left) Douglas Thor, Chrysler Jupiter, de Havilland Blue Streak and modified three-stage and one-stage solid which may be utilized popout topping the Blue Streak three-stage. This is first picture of complete Blue Streak.



SPACE TECHNOLOGY

Republic Broadens Space, Missile Fields

By J. S. Bots, Jr.

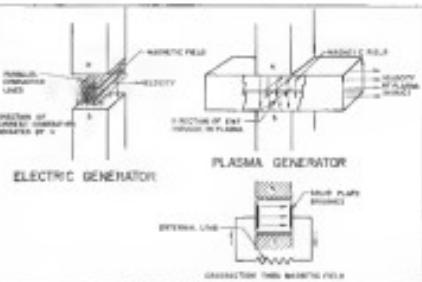
Pineydale, N.Y.—Plasma engines for use in space, in the atmosphere and as a key element in electrical power generation systems are being developed here by Republic Aviation Corp.

Other present projects at Republic's research and development program, which is devoted primarily toward space vehicles and equipment applications, include:

- Catalog system for helping take on a very long, slender body of early test vehicles so that future missile early warning systems will not give an alert as they pass over.
- Trajectory studies for plutonium reactor instrument probes.
- Study of plume growth under the very low pressure conditions desired toward construction of an efficient gas-turbine for use in the rocket engine.
- Development of 10,000-ft altitude systems.

Republic is engaged in a \$15 million research and development program over the next five years to broaden its activities in the missile and space field. This element in the program is the core structure of a \$14 million Engineering Research and Development Center at Farmingdale in close proximity to the corporation's main facilities. Laboratories in the new center will enter all experimental work related to entry and high speed aerodynamics, materials development, guidance and control systems, fluid dynamics and thermodynamics.

The plasma engine work at Republic under the direction of Al Kusner, is unusual in several aspects. First, a version of the pinch effect has been used



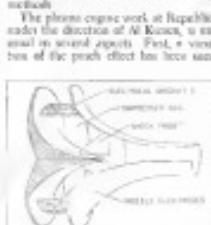
ELECTRICAL power could be generated by extracting the plasma jet through a magnetic field (upper right). It would duplicate the action of a magnetic igniter across a short gap (left). Both ends of the plasma generator duct would be stationary. View of bottom is looking into the generator duct and shows the leader wires.

it. Thin combustible gas is admitted as it passes out of the nozzle. Deflection of the gases thermally can add much more energy to the stream than heating of the fuel in a normal power jet engine, and it will allow much faster engine operation and energy or heat.

The combustible gas applicators figure in Republic studies of vehicles which use plasma engines within the upper atmosphere and electric generating equipment for both ground and flight fuel. Electrical power would be generated by discharging the plasma from the engine nozzle through a magnetic field. This would be analogous to the action of an ordinary generator which generates electric current. By moving a conductor through a magnetic field, the former in the plasma generator are stationary plates just the side of the duct through which the plasma is accelerated.

Plasma-jet studies indicate that the plasma engine, using the energy from the deflection of combustible gases will be able to generate enough power for its own sustenance plus about 10% excess for the operation of another component needed in a space vehicle at orbital velocity. The efficiency of the plasma motor is said to be about 4% effective for ground use. It would be possible through this arrangement to eliminate the heavy generating equipment needed to operate a

DESIGN FOR LESS C/V/W



PLASMA jet could accelerate a sheet of plasma bodies also have combined into passing a combustible gas between the plasma sheet and the sheet wave it creates. Deflection of this gas could greatly increase the power of the jet.

The basic idea of this applicator is to convert a combustible gas between the surface of the accelerated plasma and the sheet wave traveling ahead of

Above are three stages in development, showing Stavid advances in high density packaging. *Panel A* is the *one* component design.

Unit A, a portion of a guidance system developed in 1961, was redesigned by Stavid in 1965 to reduce it by mechanized assembly techniques. Although no savings was made in construction, Stavid achieved a 75% volume reduction and a 40% weight reduction—and added a regulated power supply (Unit B).

Unit C is the package, mechanized through the use of solid state components.

As a result of years of experience in designing for low volume and high-speed assembly, Stavid has developed an important capability—in that of reducing volume, weight and production costs—and in due course proving greater reliability, producibility and manufactureability in all types of electronic equipment, including the most sophisticated systems.

OTHER STAVID PROJECTS INCLUDE:
Your Interference System • Princeton Pulse Measuring Set • the Hi-Dr Test Systems



F.T. POLlicino, President
Engineering has specialized in the development and evaluation of electronic components and systems for high performance requirements. He has participated in a great many of milestones in the development of electronic components.

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Opportunities in engineering and science are denied to anyone who opportunity
is denied to advanced systems research areas.

plasma capacitors or other electric powerplants.

Rapibus at present has produced about one pound of dried plant material per square centimeter, and it is believed that two more years will be required to reach marketable quality, at a price of \$1000 to \$12,000 per acre for the cost of fire tests.

Rapibus also is conducting a study of plant growth under various pressure levels. It is expected to show the lowest pressure level which will allow normal plant growth, so that greenhouse crop yields can be based on the results.

These studies have revealed that the best pressure level for growth appears to be about 8 to 10 psi. Some plants grow considerably faster at this pressure than at the current 14.7 psi. An after phase of the study will try to determine the effect of one gravity on plant growth. While it is impossible

to create zero gravity on the earth, a test method has been devised that involves some acceleration.

The test rig was a long box with plants growing down from its top and up from its bottom. A light was placed in the center of the box, which was made light tight. According to present assumptions, though, all of the plants should have equal growth toward the light source. However, the plants on the top of the box which were growing downward and subjected to negative g had about half the growth of the plants growing upward.

After the initial period of growth, the box was turned over and the started plants died when they entered the negative g condition. The growth of the several plants was greatly reduced when they had to grow downward toward the light.

Humphrey Blasts Data Suppression

Washington—Sen. Hubert H. Humphrey (D-Minn.) last week urged Congress to be constantly alert to guard against deliberate or inadvertent suppression of important facts by government agencies when national security is not involved.

In his role as chairman of the Senate Subcommittee on Disarmament, Humphrey said he has received a great many tips that suggest executive branch sources have classified testimony for nonexistent reasons.

Disagreements between the Senate Hearings Subcommittee on Government Information headed by Rep. John E. Moss (D-Calif.) suggested that congressional committees is unable to extract the relevant, review all testimony, review all testimony, and identify documents related to classified information if the records are called for and are.

Moss and his committee have long been active in fighting against government secrecy policies, and at one meeting recently he asked the withholding of information may be justified under national security (AWW Mar. 18, p. 21).

Humphrey, in his statement, said that in most cases, however, he did believe in classification of information as a deliberate effort to deprive the people as to just what the government has planned. But due to the lack of being over cautious and following the rules, "when in doubt, classify."

During the past year, Humphrey explained, the Senate Subcommittee on Disarmament held a number of hearings, many of them in executive session. Usually, the testimony was submitted to the committee agency involved for review, and the agency then marked parts of the testimony that in its opinion should remain classified.

The subcommittee still received the testimony after its return. Humphrey said, and when reasons for classification were not self-evident, the official were questioned. Frequently, he added, a reason, either that security was given the preference over the information, and others that "surveillance" measures were pointed out that officials often listed the classification label.

To illustrate the need for vigilance over classification of information, Humphrey outlined an example:

"The Central Intelligence Agency, in reviewing testimony given by a noted scientist, identified a passage which referred to the transfer of plutonium in Russia and China each year which we expect to a given world of nuclear weapons. When questioned, the CIA official indicated he did not agree with the conclusion of the scientist and that such information should not be given out. When challenged further, he

Satellite Interceptor

Washington—Advanced Research Projects Agency has awarded a \$500,000 contract for detailed study of a satellite interceptor system to Rader Corporation of America's Model Electronics in Costa Mesa, Calif., as selected by Army Materiel Development and Test Center, Wright-Patterson Air Force Base (FMS 5, p. 22).

The one-year study will cover all aspects of the satellite interceptor problem, including detection, tracking, selection and intercept. If the RADA study proves the system feasible, ARPA, arm's well-qualified bid for bids for further analysis and development. Programs in part of ARPA's Project Delos are intended to develop a system of space defense for operation in the 1965-70 time period.

For the CDA official agreed to let the testimony stand.

"The test rig was a long box with plants growing down from its top and up from its bottom. A light was placed in the center of the box, which was made light tight. According to present assumptions, though, all of the plants should have equal growth toward the light source. However, the plants on the top of the box which were growing downward and subjected to negative g had about half the growth of the plants growing upward.

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AMERICA'S FIRST EXPLORER satellite was boosted into orbit by high-speed rocket boosters produced by CDC, under a contract to California Institute of Technology's Jet Propulsion Laboratory. As sub-system contractor, CDC produced the solid propellant motors and performed the final assembly on the three stages; dynamically balanced the entire final assembly and, as subsequent Explorer projects, provided telemetry antennas and power pack equipment.

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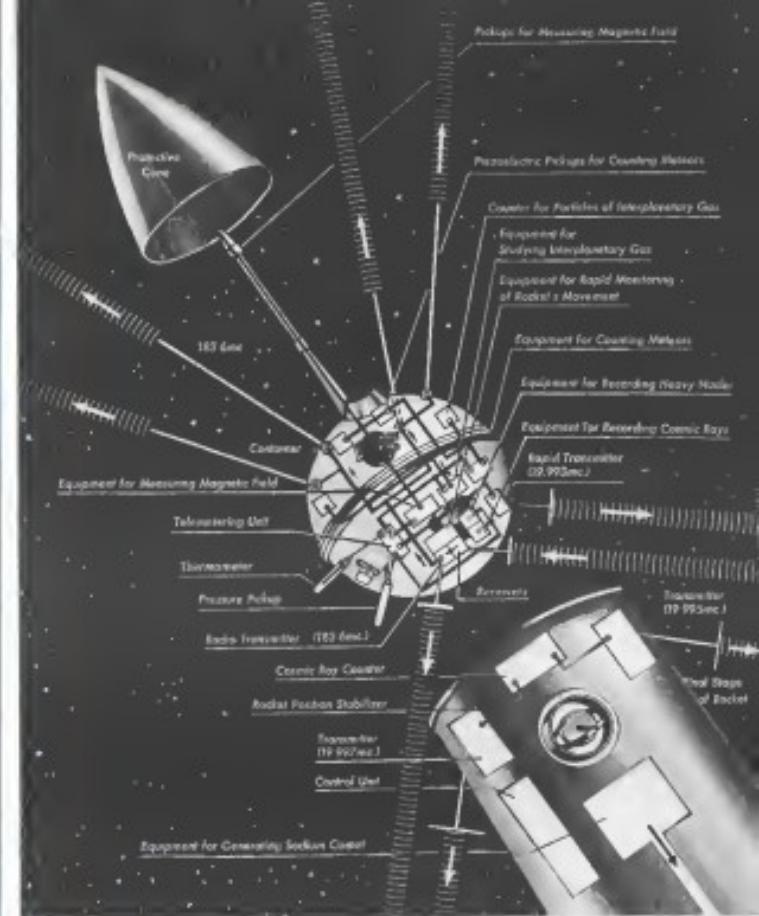
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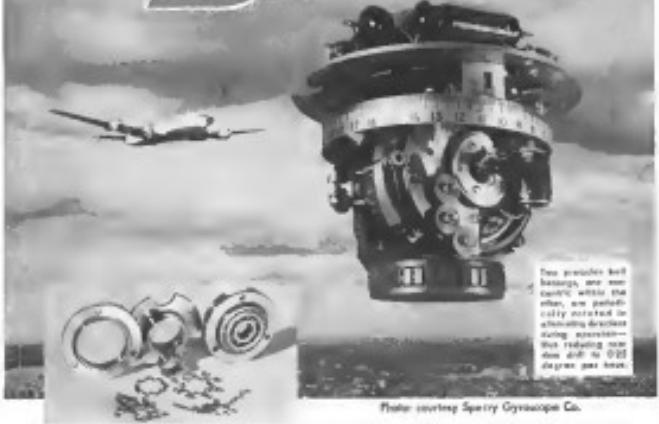
Mehta Telemetry, Instruments Detailed

AVIATION WEEK June 28, 1959

Detailed diagram of Soviet R-7A's solar panel module taken from a drawing in the Russian publication "Tekhnika i Sistem

data," shows instruments and telemetry equipment carried in the satellite itself and in the first stage of the launching rocket.

CASE HISTORIES



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Reliability Is Vital Space Flight Factor

By Richard Sweeney

San Diego—Normal space flight requires reliability of reliability of reliability. For example, evaluation of the American Rocket Society was held by the Space Sciences division of space flight development in Non-US Government Aerospace and Space Administration of the semi annual meeting here.

Silverson said one of the most important requirements is a basic understanding of the reliability problem. Many applications of reliability need to be considered, in individual components, subsystems, entire systems, plus all total vehicle reliability, in terms of both operating characteristics and confidence factors for it.

Silverson pointed out that a failure for the Space Shuttle vehicle, which would affect approximately seven stages to get man to the Moon and back, would require a much higher order of reliability than that which is normally thought of as "acceptable."

Several approaches have been used by Silverson toward reliability, being considered as an area success itself. While it is needed, he said, an intrinsic, systematic analysis and top engineering talents which would make best use of the information gained from both the substantiation and the analysis.

Design for Reliability

Required, according to Silverson's design for reliability, as which can often be most economical for the designer. These functional attributes of high enough margin to engender a 100% confidence factor in a system, are more important. An example, he cited, is a system which would be required to reduce contamination artifacts in a nuclear engine, including the capsule mounting.

An other approach used by Silverson was the development of ground test facilities and equipment which would be capable of testing systems for their total reliability. These facilities would need complete environmental simulation, including high acceleration, low density atmosphere. Silverson added that in the refugee test facilities such as were available at Lewis Flight Propulsion Research Center, which he formerly headed, where he and complete testing could be accomplished under simulated conditions.

Silverson said it is in the testing that the required space service, the orbital decay rate, can be established, once it is determined.

Efforts to meet artificial deadlines according to Silverson, is a mistake. It is much better, he said, to completely

design systems, then launch when the required reliability level has been reached rather than to race against deadlines or unproven procedures, to provide established and accumulated data for certain items.

In comparison with the Silverson and that the delayed Venus probe and corrective orbit module (AW Feb. 28, p. 20), will be concluded, but will begin the first uncrewed dynamic proximity operation test flight, these problems will be sent into deep space, in games or much specific information at the payloads are capable of obtaining.

Silverson said he believes NASA now is beyond such things as "new games," i.e., trying to make these difficult deadlines when there is leading more toward sound and complete engineering and use of all elements of space systems, before sending them on their flight.

Mercury Right Date

Silverson stated that there is no excuse single day schedules for uncrewed flight in the Mercury project.

He added, the flight will be made when both the man and the vehicle are ready, and all conditions are in demand. He did not, however, state that there is a particular desired or target date, which has been announced previously.

Silverson acknowledged that at least the winter recess provides for the Mercury capsule is difficult. He suggested that the next step program will be made in the summer, when the capsule is ready, and all conditions are in demand.

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Silverson acknowledged that at least the winter recess provides for the Mercury capsule is difficult. He suggested that the next step program will be made in the summer, when the capsule is ready, and all conditions are in demand. He also said that the L-1D of 11 to 12, which is composed of intermediate vehicles. Using the values cited, Silverson and the Mercury documentation books can be consulted, in addition to getting the prior considerably more general over what his office will actually come out.

The Mercury capsule is planned to make three circumlunar orbits, with an approximate 90-min. period, at a altitude of 100 to 150 mi. Silverson said, however, that the capsule might be allowed to go up to approximately 10 minutes, which would extend the time to somewhere over 24 hr., and previous for the astronauts' safety reasons, the capsule must have time for at least this time period in the Mercury capsule.

Follow-on to Mercury would most

probably two more sites on addition to making the second attempt of 100 mi in obtaining the Silverson said, and that a capsule shape for the two runs and having the desired 30° will be under development at Ames Research Center of NASA.

Among other space flight problems mentioned by Silverson were the need to investigate payload durability at temperatures from hot stage rockets. The hot temperature in several cases, he is knowledgeable, and perhaps may be due to "cladding," a phenomena of the final few steps of launching which occurs with solid propellant rockets.

Silverson also said that the present probes are not optimized. Their gross weight to payload ratio of 1,000/1 is too high. He cited the case of the Soviet Venera 4 (AW Feb. 2, p. 36) which had 1,800/1000 per shot, instead of the current low ratios that appear which is the case with other vehicles.

Silverson detailed capabilities of several current boosters both in the Thor Delta, the Vega, Centaur, Atlas and Nova, for which NASA has contracted. He added he is sure that each of these will be required part of later booster systems. Another aspect of these, he pointed out, is that vehicles control in later stages is going to be required to offer safe landing on the moon, as moon landings and liftoffs will return to earth.

Silverson also acknowledged that one month, the Soviet Union has conducted larger boosters than the U.S. and there is a definite need for the U.S. to catch up in this field.

Deep Space Regime

Silverson set in fact that realistic only the first application for a nuclear rocket would be a deep space engine, rather than a booster to lift the vehicle from earth. He also said that use of nuclear power for planetary electrical power for satellites and reentry should space vehicles will be required before the use of nuclear reaction for power generation.

Silverson noted according to Silverson, the first to be given a role in the larger booster situation. However, he said, this will be studied for future possibilities. It is anticipated however, that the small nuclear electric power plants will have a place, actions established through part effort, he said.

Silverson also said it is realized that the U.S. will need an experimental breeder, or else will have to obtain vehicle control to change orbit, in order to obtain an equatorial orbit.



SMOKE POURS from the tail section of a Fiat G.91 as a maintenance specialist (by wing) inspects the tail of another aircraft.



FIAT G.91 (above) lies on its back after landing on a grass strip prepared by the Italian team at Rivalta. At left, Fiat said last, the G.91 (below) comes in over the end of the grass run way at about 150 ft before touchdown. Photo has NATO camouflage and wings on tail. Unpainted metal panels on nose are uncamouflaged insulation from another plane.



CAPT. BIANCHI flies in post-flight report while instructor checks nose of landing and one of the aircraft's main landing gear.



G.91 Conquers

By David A. Anderson

Rivoli Air Base, Italy—Five Fiat G.91s are operating off a grass strip here in the final phase of trials with the Italian team.

Eight pilots and 35 ground crewmen from the 103d Light Tactical Fighter Group are living and operating under field conditions on the grass surface of the base. They simulate at times in 15 series on the airfield during the flying day from dawn to dusk in a tough program designed to prove both the aircraft and the concept of a ground tactical unit to operate them.

These trials are the final phase of the design of the Italian air force's concept of five major hurdles to be cleared by the little fighter before its acceptance by NATO.

Fiat evaluation by NATO is scheduled to start soon by inspection teams of pilots and ground specialists from England, France, Germany, Greece and Turkey.

Pre-Series Aircraft

Airframes suitable for the trials are part of the original order placed with Fiat for 27 preproduction aircraft. As a result, many of these planes differ slightly in detail, and all are possibly fitted differently. In spite of these minor differences found in any pre-production aircraft, there have been no major changes in the program because of unreliability.

Trouble-free trouble with the Fiat G.91 has been so few that the statistics about the trials are depicted at these few figures. For example, the rate of maintenance time hours in flight time is only a fraction of the usual value the Italian air force has come to expect for its operational aircraft.

Some kinks have been made by Fiat at its own expense, some more have been requested by the military. The rugged operating conditions on grass and takeoff-deck, road, later night, maintenance people say they didn't know what they were up to, and have painted out different engine vibration degrees. There also was a request for a smaller ratio of the distribution of the Bristol Orpheus engine, which showed up as factors of the aluminum blades and on the fastenings of that long, broad, lightweight propeller. But, though, Fiat and the Italian referees have been experiencing in the meantime, and there are signs that that trouble is now behind. Engines with steel blades replacing the first-stage aluminum ones have been cleared for 150 hr of military operation, a high

Mud in Grass Field Operational Trials

Report for a relatively new engine.

The air base at Rivoli has a concrete runway, hardstand and berms, surrounded by the high grass of the green plain of Vasto Province. On the hardstand area at one end of the run way is the operational base of the flight commanded by Capt. A. Cahn.

Here in the pre-series trials, a command post and control center, a dozen or so vehicles, five ambulances, 21 pilots and tankers were flying even when we observed special teams inspecting and testing. The operation going down even took turns all were changed but, every refueling operation to establish a series of night tests and rotations for the future operation of the light fighters.

Just in we pulled into the area, two pilots—Capt. Bianchi and Segregato Major Bianchi—had crashed into a pair of G.91s for the fourth mission of the day. They had been scheduled for the period between 0600 hr and dusk, and the weather was excellent (no rain), meaning that the aerial flying day would be shortened.

Bianchi performed their engine with a couple of seconds after getting into the cockpit. The burning fuel of the turbolenters was followed by the whining roar of the Orpheus and both engines howled off the grass strip around the hardstand and hard up at the end of the runway parallel to the concrete strip.

Reconnaissance Mission

Major W.W. Reconnaissance original flight scheduled for the day had been instrument testing of bombs and F-117A AR ordnance. Bad miserable weather over the target range had forced these missions to be rescheduled and the same mission job substituted.

Round trip, Patriotic task, all within bounds of eyesight, the sky above the runway, leaving behind a trailing plume of broken earth melted loose by the Orpheus engine. Painted tanks have been made on the grass strip. But these tanks were started with separate igniters and the fire spreads delay between them was enough to let the strip be blown clear at 200 ft by the light crowd. Both planes got off at normal gear weight at about 1,000 ft.

Less than one hour later they were back, smoking over the field in a tight pair, then parking off for the routine pitstop. The G.91s came in at about 150 ft in a high flat approach at a low angle of attack. Both pilots judged the hole choice which are used on crew hunting for two hours, first, to get statistical data to elicit life and



REFUELING TRUCK goes to fuel while oxygen and nitrogen bottles are refilled from small truck in foreground. Note long up-dog chute on fuselage tail cone.



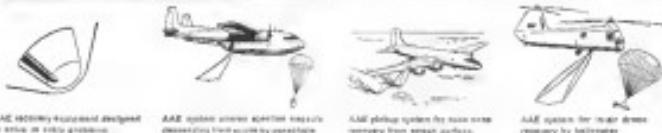
MANHOLDING the G.91 is the fastest and best way to move the light fighter on the ground. Assisted pawl fully and holding firmly is absolute at height, helps make possible complete changing of paved surfaces from plus to minus.



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SPECIAL MODEL UNIT for the attorney has an compressor in truck body for blowing glass debris. Note bands built for two airplanes on low deck.



FIVE-INCH ROCKETS are carried on the special truck pulled by or from truck, one of which is shown attached to the right.

second, to prevent overheating the brakes, which were specifically designed to operate with the chute.

Learning the lesson, the pilots quickly release the drag chute on the test wave, and a jeep driver retrieves it. By adding the G-91 to the chute on Pinto's aircraft, G-91 helped to keep the pilot of the plane gathered up. The chute had hooked it to the pilot who tumbled into the spinning car with the chute draped over the right-hand cockpit seat.

On the ground, the pilot again quickly released the chute on the Italian sports car, lightly and gracefully. The pilot showed the cornering characteristics with wings remaining level for a high-speed turn into the wind.

While the plane was taking off, it trailing smoke and sooty smoke, converged on the spotting area. So did the spectators, taking notes and stop watching over plane of the aerial. Planes were refueled, oxygen and oxygen supplies recharged, a new soft slide dropped into the submarine, a

little hydraulic oil added to top off the system, and the launch was borrowed down. A few feet above ground, the capsule landed in, and was all set for the next mission of the day.

Typical mission time is about 10 minutes; total mission time is less than half that.

Ground Operations

Beyond the fast rotational test engineers into the design of the G-91 is the Italian suspension and level of mechanical skill. Their wartime aircraft were operated rougher than the local was how to ergonomic parts and next best methods. That knowledge has carried over into the present Italian air force.

Mechanical ability of the ground specialists in fastidious observation from afar or far away have always been a need at the small number of we classes needed to maintain such an airplane, and at the low number of cameras

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MAJ. CHARLES L. LEWIS holds a drawing of proposed targets for the 101st Group. Drawing shows Bendix with wings. Low draw can mean of Group with Fifth Air Force, whose insignia is Don't Let the Japs In.

over hours per flight hour right across the board.

Early in the G-91 program it was decided that first-line maintenance had to be with the airmen. A series of special vehicles are planned and built to support the G-91 in the ground, and these now move with the planes onto the field.

Between sorties under combat conditions, these vehicles would disperse under nearby trees or other natural cover. They speed and weight over rough terrain would enable them to start loading up the planes soon after arrival on the ground after a mission. The advantage of a mobile system like this is obvious.

In addition to the heavy, refueling truck and trailer, this flight had an engine truck, an armament truck with an air compressor on board, and about 10 small, flat-top trucks, each with a special lifting device, aggregated 50 lb of the total load. Each engine truck of the three required CO, oxygen and service fire ammu. One of these has two water storage tanks, drying cloths and some other gear. One carries the oxygen and nitrogen supplies. In addition, there are a number of dollars for towing boards, rockets and other armament, and a few special combined dagger and haversacks which are used to handle the gear—especially machine gun parts. Normal replacement time of a machine gun can complete with ammunition is about five minutes.

The whole operation can strike its first, park up and move in something in the order of four or five hours. On arrival at the new site, the planes can be operational almost immediately, just as soon as the radio aerial is erected and the controller gets in place. Tents and other accessories can come later. Speed of the course over the roads has not yet



TWO TENTS and a handful of vehicles make the base for this flight of the 101st Light Tactical Fighter Group.

been established, because the only roads never made so far have been over mountain highways and long distances are representative of combat conditions. In the coming NATO trials, there will be an opportunity to pull out of an area and deploy to another.

Operations from giant strips have emerged as special problem. The engineers have developed a system of temporary strips, docks or even longer strips. And, naturally, paved runways are made with the planer scheme of each other, and the final runway is not by either one does not require an air strip near the takeoff.

Abs. thus far is the operational trials these has been as trouble with speed, even though the runs a few weeks ago reduced the distance field to a going rate and dropped the G-91s half length in the week. Refueling trucks bogged down and couldn't reach the planes; in contrast, the G-91s were able to roll through the mud to the trucks without difficulty.

Plans for operations and maintenance during the coming NATO trials will be the field at Torrejon, Spain, and Angiers. The flights in four engines each will be based on gain fields at Cazalegas and Manises, and will be required to move completely to other areas during the trials.

Support for this operation will be standard ground equipment, plus three V-101 helicopters and two Douglas DC-3s. One of the V-101s will be operated by the German Luftwaffe, one by the Germans alone, and the third will be the V-101 demonstration which will be flown by a company pilot. The two Douglas STOL aircraft will also be operated by the Germans.

Plans also behind all these trials is to test the concept of the lightweight strategic fighter in the role of disrupting a 50-kilometer front. Under command of Maj. G. Gorham, who commands the 101st Orange County Tactical Fighters, which translates as Light Tactical Fighter Group.

Plans and techniques of the 340th were originally a cross-section of the Italian air force. Training on the ground was started just a year ago and the G-91s came into the squadron in Feb. 1 this year. On May 5 the unit was moved from Frostby to Mure de la Motte in the airfield at Torrejón-Sainte-Anne.

P.S. and don't forget those other quality products of the

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(Previous pages 5, 10, 12, 15, 20)
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Messerschmitt Type 153. Rearview of the company's highly successful Rumpfengen, a biplane being operated by Turbomeca as a testbed for the Atlantic turboprop powerplant. The engine is rated at 470 shp, and drives a Rotax propeller. Fuel consumption is 27.6 lb/hc.

Paris Show Stresses Turbine, Rocket Developments



Paris—All I know is that the Iso's the thing they can't," said a bemused technician after long sessions on the shade of competing jet-powered monoplanes at the 23rd International Aerospace Salons.

With the advent on the new generation of engines for transonic designs, it was no wonder he was somewhat confused. Bredt Söderberg, General Director, Pratt & Whitney and Saab-Saabscania, who had designed these two types of the bypassed designs for the industry, turned to him to assist.

Both engines had pressure segments in front of the own core, and was perfectly willing to talk about it until the listener could take no more.

If he went around and propellers, there were enough of all types. The wider range of choices was thanks, engines from small paper propellers designed for light aircraft right up to sophisticated turbine engines bearing enormous turbines and intended for flight at Mach 2.

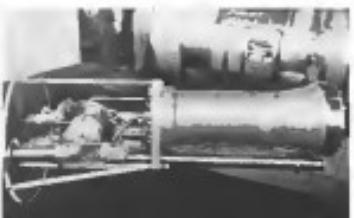
More rocket aircraft and rocket engines were demonstrated by British, United States, French and Soviet manufacturers. Two remarkable notes, both by Tschuberts of Russia, were also at the show concerning nuclear in fissile, pluton and thorium plants as the Europeans confirmed.

Solid propellant rockets, their strange star-shaped charges looking almost designs were also displayed.

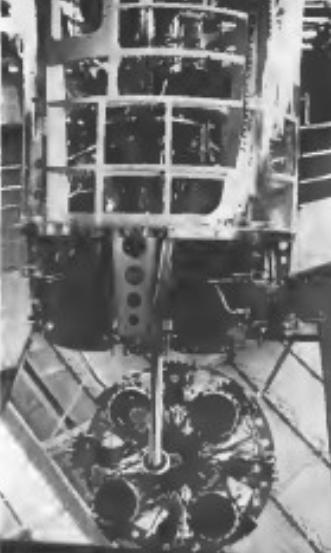
Turbomeca Radial turboprop engine is now certificated for 700 shp, and is rated at design figures of 1,150 shp. Engine will power Dassault's Concorde and Spica, New Heintz Super Bimot, Messier's Espace and Sud's Vigilant and Diplomate.



Canted view of J 27 fighter engine developed by Svenska Flygmotoren of Sweden shows layout of engine nacelle. Note double shock inlet diffuser system, bypass duct and buried in nose spar and fuel injection at debris stream end.



V3 liquid-propelled rocket motor was developed by Svenska Flygmotoren. Thrust rating at 3,200 lb. at 19,360 lb. available in increments from 4000- to 16000. Fuel is kerosene, and oxidizer is 10% hydrogen peroxide.



BAC Strikemaster exhibited engine of BAC Kestrel two-vehicle fighter-bomber under test. Engines are provided for assembly in the vehicle. Design of the engine was developed by BAC and Armstrong Siddeley under license of Wimpey, and production was awarded to Armstrong Siddeley Motors before merger with BAC.



Cascade reentry in RAE-Kayser (left) is tested by reusable plate during normal operation. BAC's later warheads SEPR 541 rocket package (right) is intended as warhead powerplant for Dassault Mirage 3. Hispano-Suiza is producer.



SAUNDERS-ROE SR.N1 Hovercraft prototype has started its first trials. Here propellers start along sides.

Prototype Hovercraft Tested on Water

By John Tandaff

London—Saunders-Roe, Ltd., aircraft experts based at Shoreham-by-Sea, 100 feet (30 m) off the coast, have completed the first wind tunnel tests of their SR.N1 prototype ground-effect vehicle.

The SR.N1 prototype Hovercraft successfully completed two hours of free hovering flight and made its first water hover trials. In the sea trials the

vehicle's jet engine generated a spray which completely enveloped the craft.

Use of a peripheral jet or overwing air nozzles to seal the supporting air cushion more completely distinguishes the Hovercraft from other known ground-effect vehicles including the Avia Aircraft, Ltd., project of Czechoslovakia; the MBB H1, a Dillinger C 3; Cockrell told AVIATION WEEK.

Because of the future which now seems at the principles of the jet flap nozzles, the air cushion is much more economical, Cockrell said.

The SR.N1 is 10 ft. long x 24 ft.

wide and weighs 31 tons. The aircraft is powered by a vertically-mounted, four-bladed ducted fan powered by a 435-kw Alvis piston engine.

Two propulsion ducts fed from the fan will give the prototype a speed of 10 ft. at a height of 15 in. A straight catalytic system is planned as a lower cost application for use as a communications and supply vehicle in remote areas of the Commonwealth. It could probably move 1,000 lb. with a maximum takeoff weight of 35 tons with cargo to help maintain service over banks.

Apparatus exceeding 40 tons gross weight the company says could allow the same sort of load per passenger load, as conventional land and sea craft. Hovercraft of the craft is expected to fall from 130 hp to 70 hp-ton as size increases.

All known developments of ground effect vehicles are based, Cockrell believes, on the principle of the air bearing in which air at low, forced through scoured passage, develops a pressure differential which is used to sustain a support film of air. In the Cockrell design the air cushion forming the bearing film is part of an air circuit that is a simple pressurized air system. Below the film is the air cushion which acts as a flexible journal and oil bath of its motor.

The ability of the jet engine to



LEFT STICK controls for elevons in Hovercraft's propulsion ducts. Two fins on the side ducts are actuated by the center line. The right stick moves forward or backward to tilt downward propulsive ducts. Engine output is controlled by twisting the grip.



Next Stop—Le Bourget—6 Hrs., 4 Min.

Pan American Jet Clipper

Record Flight Sparked with AC Igniters

On December 11, 1958, one hundred passengers aboard a Pan American Jet Clipper were shown that Paris is now less than an hour's flight from New York. This record-breaking flight was powered by the Boeing 707—powered by four Pratt and Whitney engines—operated by AC jet igniters. Pan American specifications call for more than speed. Pan American also insists on greatest performance and reliability. AC has a reputation for performance and reliability—a reputation built on a long history of pioneering firsts in the field of aircraft spark plugs—and a full 15 years of experience in the ignition field. That's why Pan American has confidence in AC—AC SPARK PLUGS. THE ELECTRONIC DIVISION OF GENERAL MOTORS.



...NEWS IS HAPPENING AT NORTHROP

Demonstrating the platform of LINS - new, Lightweight Inertial Navigation System - is Dr. William F. Bellman, Vice President and General Manager of Nortronics.



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A recent development at Northrop's Guidance Systems Division revealed the most advanced precision inertial guidance system ever assembled - the new, Lightweight Inertial Navigation System - includes platform, platform electronics, environmental control and mounts. Total system weight: slightly in excess of 100 pounds. Encapsulated volume: less than three cubic feet.

Actual working hardware, LINS is a complete, precision system for aerospace navigation applications in advanced aircraft, missiles,

missiles, and space vehicles. It is truly now the last result of Northrop's more than twenty years of creative research and production in the field of advanced guidance and navigation systems.

If you want to know more about Northrop's today regarding LINS, for your own system requirements, Northrop's experience offers unique and proven capabilities in tailoring the design, development and production of complete and integrated guidance systems to your requirements.

NORTRONICS
NEWPORT BEACH, CALIFORNIA
A Division of Northrop Corporation



PROTOTYPE vehicle carries a slightly less than designed height of 15 in. as a pressurized air pocket trapped by an outside

valve. The pressure differential created in the pit pocket across it depends on the velocity, mass and initial injection angle of the peripheral jet outlet.

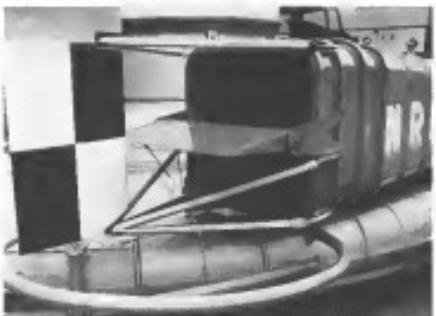
According to the basic principle, the air in the corner which is initially directed inward and slightly downward, is deflected outward by pressure in the pit. It thus approaches the ground transversely and escapes. Total change of orientation per unit length of the peripheral system of the pit is equal to the position at the pit ratio in depth. Essentially all the losses in the corner are due to the corner on which corner. No air exits from the corner.

Because the change in orientation is much less than the deflection imposed on the jet, the maximum ambient pressure is reduced when this angle is a maximum. This fact also has an inherent stability characteristic. As the jet corner is initially inclined, the direct contribution to the lift due to its vertical component is only slight.

Two Peripheral Cansons

In the current design two peripheral canons are used, three feet apart and, according to computation, the canons. The net pit roll is maintained at 10 ft per square foot and the roll area is 17 ft per square foot.

Computer engineers decide to level the corner for splitting the air corner but the corner canons appear to be an obstacle with respect to deflection in the pit. As change of orientation of the corner is a function of jet velocity as well as angle of deflection change, and as the deflection of the jet corner is increased indefinitely, two shelves like valances jet corners with smaller



BOTH PROPULSION DUCTS have slots and can flow in the corners at both ends. The corner turns differently for lateral control and in plane for pitch control.



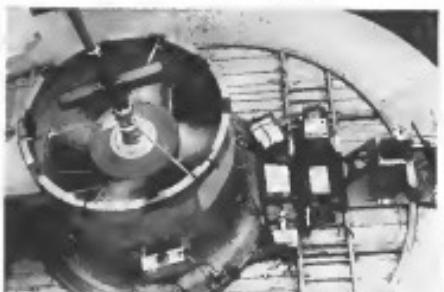
PERIPHERAL slot directs air corner inward and slightly downward. This acts as a flexible pressurized seal which traps a pressurized air bearing pit beneath the vehicle



WASP (vertical liftoff aircraft) during test water trials. Aircraft of the same weight as the Queen Mary (in background) is hydrologically unstable according to Lockheed. The vehicle is reported to ride waves well due to its own natural wave response units.



WASP propulsive ducts (left) from the fan exit give prototype Hoversail a speed of 14 ft. at height of 15 m. Front propulsive valve (right) is being closed in the prototype vehicle never forced. Vane exit propulsive duct (right) shows one gate valve plus two short vents partly opened to admit propulsive air seaward through lowered porting.



FREE FLIGHT MODEL of the Hoversail has no electric fan motor to provide lift. Propulsion is provided by a small propeller driven by a 1.75 cu-in compressor engine (right). Reconnecting motor and to reverse lift fans, fan is driven by a helical screw driver.

pressure differentials would appear to minimize the compressibility losses associated with a single high velocity jet current.

Current evaluation of the air cushion could also be usefully employed to compensate for unanticipated loading, and might well prove useful when traversing sharp oscillating ground.

Control System

Control action of the prototype is not likely to be shared in later craft. It uses air input from the lift fan as two propulsive ducts. Elevons in the duct outlets are moved differentially through a stick for lateral control and moved in phase for pitch control. These motions are repeated at the rear end of each duct for control when the vehicle moves forward. The control is obtained by varied venting in the rear exit ported by four gates. Engine output power and directional control are obtained by both lift and forward motion of a second ported lever.

The design is inherently stable as an increase in height leads to a corresponding decrease in pressure and a decrease in height is followed by an increase in cabin pressure. Tests of a one-eighth full-scale model shown in a film demonstrated the ability of the model to ride wave systems well due entirely to its own natural wave response characteristics (AW April 27, p. 72).

With relatively short, steep wave systems (0.0 ft. pitch, 2.0 ft. amplitude) the craft tended to drift more noticeably when crossing at 30 ft. With normal control, Lockheed said, this undesirable effect could be eliminated. In any event that would appear to be an important milestone in the development of an amphibious aircraft. All disclosed research of the SRNL will use either a concentric profile or ducted fans to provide horizontal thrust.

Model Tests

Water tank tests and free flight tests have been carried out with two models—an aircraft and a one-eighth full-size. Both are dynamically similar with respect to weight and inertia factors and are geometrically similar, with exception of proportion details of larger model.

The smaller model used for the tank tests weighs 35 lb. and has an lift fan diameter of 1.1 ft. and a propulsive duct which also provides the air flow for both propulsive ducts. The free flight model has an electric fan motor of 1.75 cu. in. the same horsepower driver. In the latter, going along one route, endurance. Propulsion of this craft is provided by a small propeller driven by a 1.75 cu. in. compressor engine. To conserve the batteries, the fan is driven by a helical screw driver.



WASP

THESE MEN DO ALMOST NOTHING BUT THINK

Unique new group helps Westinghouse anticipate and plan for future military needs

It's harder than ever to stay out front in defense.

Weapons systems are now fantastically complex. New innovations—like thermonuclear and molecular electronics—threaten to make key subsystems obsolete overnight. New developments may suddenly reduce the tactical usefulness of a U.S. weapons system.

Westinghouse, like many other firms, has been concerned about how to meet this problem—and how to organize it. The HED and management operates in the most effectively support America's increasingly complex defense needs. It seemed that the organization which had worked fine in the past simply wasn't adequate for anticipated future demands.

So things were completely reorganized in February, 1968. A new Defense Products Group was established, centralizing control of all defense-oriented activities within the company.

But a most interesting—and promising—part of this new organization, the new Westinghouse Advanced Systems Planning Group (now commonly called WASP), wasn't announced publicly until August.

This was a significant development. Since technology is moving faster than ever before, there's a need now to effectively anticipate what will be required in 5 to 10 years—and to can be done. A fast-lived defense system can be developed more quickly and maintainable systems can be moved. WASP should be able to provide the advance thinking needed by Westinghouse to meet this need.

Staffed with hand-picked engineers and specialists—specialists in electronics, pulse space, atomic power, ASW, operations research, etc.—and headed by Alan Clinton (top center photo above), WASP operates on a unique charter—in concern itself primarily with



MATURING NAVAL REQUIREMENTS with Westinghouse capabilities, Captain Dow, a professional career specialist in naval strategy, tactics, and weapon systems, is visualizing advanced technology to future naval systems.



"The idea is simple, but how can we have it done from up?" Present limitations permit work more suited military best suited. None they won't work either in this case."

complete advanced weapons systems, to deal with the "whole" instead of "parts".

This is not just a "blue-sky thinking" assignment. Westinghouse believes future defense needs will be so complex that only a full-time team of specialists—like WASP—will be capable of the kind of conceptual planning and guidance needed.

There's another reason why defense planners will be interested in WASP. This new group gives them a single point of contact with one of America's largest and most versatile industrial firms to which they can take immediate and long-range defense problems. No longer will it be necessary for someone



"What's the best way to destroy an enemy reconnaissance satellite? Attack it from earth? Or from another satellite? How would we go about other methods?"

to try to guess which Westinghouse division is best equipped to tackle a given job.

This is a bigger advantage than might be apparent. A newly-published capabilities chart¹, for example, lists 25 different Westinghouse facilities and, for each, indicates specific study, design, or manufacturing capabilities in 33 different areas (radars and rocket powerplants, torpedoes, missile base equipment, etc.). This same chart lists 16 Westinghouse facilities which can handle system analysis and 7 capable of complete systems management.

¹Available to qualified individuals and firms upon request.



MAN ON THE MOVE, Bill Robinson has his sights on tomorrow's systems and provides guidance for WASP in planning for future Department of Defense needs.



TOP ENGINEER AT WASP, K. Saryanov, a 25-D. from India, keeps WASP and other company personnel informed of space needs. He is an authority in systems, trajectory, and command control concepts.



"Could we deflect enemy ICBMs by sending them false signals at the time of launch? If so, could the reentry from orbital boosters? Could this be done automatically from remote unattended stations?"

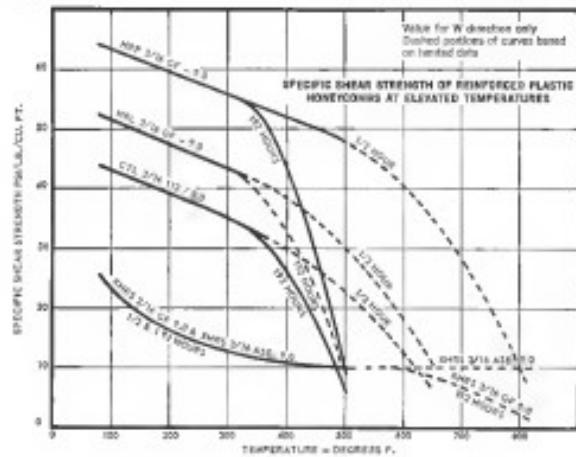
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A new family of honeycomb core materials for high temperature structures



Shown above is Graph 5 from Brochure "E"—"Honeycomb Sandwich Design" recently released by Heuck. The mechanical properties evidenced by these new types of heat resistant, reinforced plastic honeycombs (Hesco, BHP, HBL and XHRS series) offer the designer of high temperature structures an entirely new family of materials based on a new design approach.

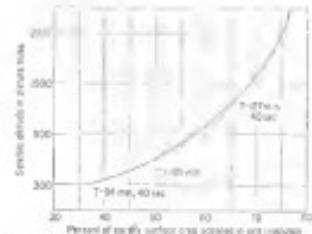
New Glass Fabricated to Need. — For the first time glass fabric, polyethylene presents new materials with all of these inherent advantages, can be tailor-made to suit specific customer needs as well as structural requirements. These new fibers/breakthroughs provide maximum reinforcement over a wide range of doses that yield an improvement in mechanical properties up to 100%, over 2214 types now in various sizes.

Hugh Sheeran indicates...The choice between SBRP, SDRP or XHRS types and between glass fibers or asbestos must

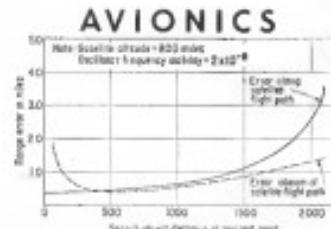


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SCANN COVERAGE of space station satellite, shown as percentage (left) of total earth's surface covered in one revolution as function of satellite altitude. Data for three satellites are shown. Faded area representing portion of celestial object for satellite at 500 km altitude is shown (right) both along major axis of satellite flight path and at right angles (perpendicular) to flight path.



NASA Considers Search-Rescue Satellite

By Phyllis L. Kline

Washington—A search committee which met last night and quibbled over the position of several army personnel, signed its defense plan yesterday that runs three major arms in under active control by the National Academy of Sciences. (See page 11.)

Space Advertisement
Such a stretch-out satellite would project the location of a crashed plane or person or perhaps in orbit at two, providing the downlink equipped with a tiny low-power radio transmitter, according to Electronics Corp., which has given the idea to NASA and to the Air Research Projects Agency.

The search-and-rescue satellite would be equipped with a small radio receiver, transmitter, and tape recorder. An earth flight personnel, stage and space capsules would each be outfitted with a miniature emergency transmitter. The device would generate a continuous-wave signal and be capable of maintaining its carrier frequency, constant to one part in 150 million for short periods of time, in the order of a few

When the satellite comes within range of an amateur station (several thousand miles depending upon satellite altitude), the signal would be received in the amateur repeater. When the satellite subsequently passes over an earth station, data could be received and the station could then transmit the earth station's information.

The proposed search-wave surveillance measures the Doppler shift or frequency of the radar signal received from the microcavas transmission which occurs because of the motion of the mobile

relative to the search object. The magnitude of this doppler shift is directly proportional to the relative velocity between the two—the rate of change of distance—and reaches a maximum at the instant when the distance between the satellite and emergency transponder is a minimum.

Lower Southern "Winkles"

The rate at which the magnitude of dippler shift varies with time, is a direct function of the distance between the conjugate transmitter and the satellite at the instant of the second approach. For example, if the satellite's orbit brings it directly over the earth's geocenter, transmitter, the magnitude of

The doppler shift will change more rapidly than the frequency transmission if six stations on either side of the satellite's path at the instant of ascent approach. Similarly, the rate of change of doppler shift will also increase rapidly when the contingencies mentioned in § 1 above of the satellite's path than if it is 16 km. ahead of the instant of

If the orbital time when the dipole shift is a maximum and the ratio at which the dipole shift varies can be determined, it is possible to determine the ionosphere bias error position, assuming that the precise position of the satellite at any instant is known from accurate tracking orbit computation.



SEARCH-RESCUE satellite proposed by Space Electronics Corp. records signal from emergency transmitters carried in delayed firecracker or space capsule and subsequently alerts a rescue station, a function it would perform automatically, without manual control.

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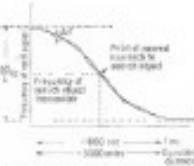


HOW IT WORKS

In a matter of seconds, a micro-adapter combination is clamped directly to the fuel control on the engine to be trimmed. This micro-adapter is held to the trim controller (located in the cockpit) by means of an electrical cable. Then one man can make all adjustments easier and safer.

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OBJECT'S POSITION can be computed from point of minimum rate-of-change of equal frequency and its relation with time

from satellites. The technique does have an advantage in that it is not possible to determine whether the converging transmitters are to the left or to the right of the satellite's path. If the signals were standard-hopped or directionally modulated, right-angle analysis might be employed to resolve this ambiguity.

To make these measurements and determine Space Electronics Corp.'s program to equip the satellite with a solid-state radio modulator plus another oscillator which is phase locked to the satellite's own radio band, necessitated introducing these two oscillators. A beat frequency is obtained which varies in direct proportion to the Doppler frequency variation of the signal it carries from the transversing earth transmitters.

Time Recorder

This signal will be recorded on a small tape recorder aboard the satellite. The small, round recorder will provide a true time reference which is recorded on tape to subsequently establish the exact instant when the satellite was at the closest distance to the converging transmitters.

When the satellite subsequently comes within radio range of an earth station, it will be interrogated by the station and it will transmit the data it has previously stored on tape. The station then can very quickly compute the position of the emerging earth transmitters and within seconds calculate or display its location.

The surface of the earth's surface that can be covered by a search and rescue satellite in a single revolution depends upon the orbital altitude. For example, a 300-m-high satellite could see 33% of the earth's surface in about 95 min. A satellite at 1,290-m altitude can see approximately 65% of the earth's surface in 125 min, according to Space Electronics Corp.'s calculations.

If the satellite were placed in a 300-m-eccentric orbit, for example, it could see all of the area between 31.5 deg. north and south latitudes in a

single 95-min orbit. A 1,290-m-altitude satellite could cover the entire area from approximately 40.5 deg. north to 40.5 deg. south latitude.

Situations in which the search object can be located depend largely upon the inherent stability of the orbital system in which the satellite is in and the user's knowledge as well as on the geometry of the problem.

A playback receiver can also handily simplify computations with a circular set of optional computing cards, for a satellite at 3,000 km altitude indicates errors of the order of one mile for most situations. For example, if the search object is 1,000 km on either side of the satellite's orbital path, the error in determining its down-range position (measured along orbital path) would be approximately 3 m. Estimated error in determining the search object's position above or below the orbital path also would be about 4 m. (Space Electronics Corp. estimates)

Plans required for the search-beacon satellite would be quite modest because the recorder operates with other data inputs equal to conventional when it has data to transmit to a ground station. The company points out that the search response capability can be built into satellites designed for other primary functions to perform such as retransmissions at navigation.

Transponders required for a search satellite are still within the existing state of development, the company says, which will permit specific contract rates of feasibility research. The company suggests the technique could be evaluated by placing the search equipment in a ground-based test facility and the receiving transponder on the ground. Present company thinking is that a frequency of about 700 mc should be suitable for the emerging transmitter.

Space Electronics Corp. learned about a year ago from Space Technology Laboratories scientists, also employing the feasibility of using subsatellite electromagnetic waves as earth currents, for military communications (AVW Mar. 18 p. 26). The company is a subsidiary of Pacific Antennas Products Inc., Glendale, Calif.

Nuclear Device Blasts Damage Rabbit Retinas

Washington—Two high-altitude nuclear explosion-dispersed Task and Orange-cased atomic devices, detonated placed up to 300 feet above some sand and sewage-dumped communities at distances up to 1,500 mi. Atlantic Testing Commission reported.

The nuclear devices were exploded at 780,000 ft. (Task) and 100,000 ft. (Orange) over Bikini Island, a com-

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When SAC drops a pair of GAM-77 Hound Dog air-to-ground missiles under the wings of the new B-52G bombers, it has what amounts to a broad-new spaced weapons system.

For the Hound Dog's jet engine drives it so rapidly speed to a target hundreds of miles away. Its self-contained inertial navigation, set before launch by the B-52's crew, can't be jammed, can't be decoded.

The GAM-77 Hound Dog program got underway in August, 1957. The missile is already in its flight test phase. Thanks to accelerated development, it will be deployed by 1960.

SAC's and AFDC's "blue-suit" integration programs further speed the Hound Dog's operational status. As every other test missile comes off the production line, half the crew assigned to it is from the Air Force.

The Missile Division of North American Aviation is weapon systems integrator for the GAM-77 Hound Dog.

MISSILE DIVISION
NORTH AMERICAN AVIATION, INC., SANTA MONICA, CALIFORNIA



It located about 700 m southwest of Honolulu, Hawaii. An earlier Wines previously reported that the missile's test data produced a 300-fold increase in intensity of the upper atmosphere at a range of 1,320 m from ground zero (AVW May 30, p. 54).

Investigation performed during the shots showed that an high altitude nuclear explosion can be "potentially dangerous to the man" because of the rapid rate at which the power pulse delivered thermal energy, and the relatively low atmospheric attenuation coefficient, α , of C and I.

Then looking at the robbery, scientists say, who had a 3-in. wide diameter at about 80 m, the distance decreasing to 9.5 cm at 300 m, etc.

However, intensity of thermal radiation at ground level was insufficient to produce first degree burns in human beings, according to the AFDC. Radiation was measured at the firing point.

In testing effects of the detonations on radio and radar transmissions, scientists found that the explosion so disturbed the upper atmosphere that some radio waves were absorbed or scattered. Measurements were obtained from motion picture atmospheric cameras mounted. The instruments recorded some absorption at Johnston Island hours after the tests were made.

During Test Task, scientists working similar frequencies experienced markedly different degrees of blackout and some channels were operable at all times.

After the Omega detonation, the scientists noted, radio waveforms of both were distorted until after sunrise, when apparently the sun's radiation caused photo-disruption of the remaining negative ions. This created a great increase in ionization and absorption of the lower layers of the atmosphere.

Blaze measurements made by pressure valves in the earth's surface at Johnston Island showed that waves of air movement in some areas did damage to trees and shrubs. Both devices were covered draft by Richter credits.

Fairchild to Test Anti-Collision Device

Fairchild Aerospace Division is preparing to light-test its anti-collision device, called PADAR (Passive Detection and Ranging), for the Federal Aviation Agency and the Air Force under a \$20,000 contract.

The PADAR system requires the cooperative contribution of two transceivers which create a beam that is reflected over two points, the line of sight path of the aircraft and collision path.

Measurement of time differences between the arrival of the two signals gives range and rate of change between aircraft that are both equipped.



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SAFETY

Sayen, Quesada Debate FAA Cockpit Rule

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Industrial X-ray

(Continued from page 1) a circumstance involving in-flight safety and responsibility of another public. American Metal is providing an exchange of correspondence between Casper N. Sayen, president, Air Line Pilots Association, and R. K. Quesada, administrator, Federal Aviation Agency. Sayen's letter is followed by Quesada's reply.

Sayen to Quesada

A scheduled situation involving significant interest of the Federal Aviation Agency has been brought to my attention and I am asking your consideration of the question that follows. Please let me know if he takes.

As the public is informed to me, in response of the Federal Aviation Agency, I understand that it may cause them an undesirable hazard if enforcement is immediately implemented, while failing to have the pilot informed of the costs of the potential damage to the passenger cabin and flight deck reports in most cases. These reports seem to be in no jester's logic and we have been informed that some of them are for the same time the flight deck for periods of hours, 7 to 23 hrs.

We are writing you this letter addressed to all the presidents on May 3, 1970, calling attention to the necessity for pilots' assuming the controls of the aircraft and making long visits to the passenger cabin except for essential business. But that notice you sent a copy of the letter to us and we passed it along to others in hope to bring the attention of all pilots.

However, evaluate rather than the representations of the FAA forcing the pilot like a master, reduced to slave-like control of restricted stops less and longer so have obtained unreasonably its responsibility to maintain

certainty in aircraft and other properties, those representatives in here can understand our progress of policy and should have been in the exchange of correspondence between Casper N. Sayen, president, Air Line Pilots Association, and R. K. Quesada, administrator, Federal Aviation Agency. Sayen's letter is followed by Quesada's reply.)

Quesada to Sayen

In response to the concern expressed in your letter, I have had a good deal of thought on the matter. There can be no defined answer, but some logic can be made to the passenger compartment when it is a probable reason for causing the passenger compartment or the more often (radiance) area involved. I urge that you take into account the following factors before you act or make any recommendations to your members and to your visitors to the pilot's compartment.

The FAA is attempting to apply some sort of exact measurement in this general rule and to subordinate them (subjected for that of the pilot's compartment) to this condition and (not to mention) of modern people or any other place.

With all the same safety problems that are involved in the industry, the main issue in which FAA could concern is perhaps, the same responsibility that has been given to the Civil Aviation Board and the members of the Federal Aviation Agency. As an independent air safety, it seems to me that the representatives of the Federal Aviation Agency have better things to do than those which I have described.

We have a long concern at the necessity of having some qualified person from the flight deck to assist in flying the aircraft. This would be a good idea, but I am not sure if this would be a good idea. I would also like to bring to your attention that stops we have are very strong airplane barriers to these programs and although we have obtained unreasonably its responsibility to maintain



Braniff 707-220 Makes First Flight

Braniff International Airways' first Boeing 707-220, making its first flight at Bremen, West Germany, is the first of the 707 series to be purchased by Pan Am & Western Airlines, total at more than 15,000 lbs. dried out. The 707-220 is powered by JT4C-1 engines rated at 15,000 lb. thrust each. The more powerful engines are expected to give better performance at Braniff's South American route since when high temperature and high altitude conditions are encountered. Gross weight of the 707-220 is 246,000 lb. Maximum cruising speed is 605 mph. Braniff expects to take delivery of this aircraft the last of June in October.

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cabin and the accent seems to bear imports. We have pointed out to you that under our present regulations, only the pilot in command of the aircraft is required to be qualified in any particular aircraft type. We have pointed out to you that the regulations require the captain to ensure that the copilot shall be qualified and provided with a brief rating on the potential hazards to which he is exposed and that he be given the opportunity for practice training. We have pointed out to you that the pilot in command has the responsibility to make certain that the copilot is not required to be qualified on the particular aircraft until the first man in the cockpit is a rated pilot on the specific aircraft or until the pilot in command has obtained his rating. However, the Cessna program now is in operation trying to reduce this even further to a rigid rule on a complete write-off of the ratings which would well serve.

We would also like to point out again that the lead passenger, whether a head, though the word doesn't mean much, other passengers, the passengers in the cabin, constitute the pilot in command and that those same pilot-in-command regulations no longer force the passengers a different.

An occasional trip by the pilot in command to the cockpit cabin to carry out station maintenance is not unusual. We have had many occasions where a pilot has to take evasive action, in the air traffic control area, in the inadequacy of our systems, in providing the pilot in command with sufficient timely with which to work with the urban areas, or in ensuring that the aircraft remains in the proper position and at an acceptable safety level. This is still something under the federal regulations, a non-pilot crew to fly over 12 hr as a supplemental operation. In other words, those non-pilots can be scheduled to fly just seconds for 12 min from 1000 ft at 6000 ft above sea level. If the non-pilot crew is flying over 12 hr, then the non-pilot, aside from the regulations we mentioned, the two subcharters can find those rules based with eight components largely

over 12 hr. Now you can see that they are supposed to remain continuously strapped in their seats.

Our latency and consistency system are still in place.

The reason as the pilot is adequately equipped on the flight deck at all times. He is also aware of his responsibilities in the passenger cabin and of the security that he must provide. You may be in alert or healthy conditions. Your remaining on the flight deck brought to the attention of our members. However, the civilian Cessna program now is in operation trying to reduce this even further to a rigid rule on a complete write-off of the ratings which would well serve.

This is an example of how the FAA attempts to derive its base and energy, we have real problems on our hands. I trust that this is not true and that you will take prompt action to see that this problem is remedied.

Cessna's Reply

(Following is the text of the Quassala's reply to Mr. Steyer)

Dear Mr. Steyer:

I have withheld reply to your public statement letter until May 15 in order to provide you with an opportunity to make your position clearer. And in I do hope what appears to be a confidential nature of this Agency and its inspector personnel. I was concerned over the possible adverse effect upon public confidence. By issuing an order last week that your message be removed from each copy of regulations that require pilot operator proficiency more than the safety of passengers and fellow citizens.

Really should not have been the intent of your observation, Mr. Clegg. As you know, flight crews are made available through their states. Because your allegation not be substantiated in any other way, I believe a surmise that this be dismissed finally, and that the issue be

brought into sharp focus. It appears to proper, it is essential that the public have confidence in the capability and ability of all flight crews, both civil and military. It is my understanding that the public does not want to hear about pilot errors. It is essential that the public understand less during such pilots as all the trust is placed in them. And finally it is essential that the public understand that this Agency will be held responsible for any errors that may occur. The responsibility lies firmly within the Federal Aviation Agency to prevent a repetition of the three major collisions which shocked the nation and brought grief to hundreds of American families.

I do not believe your right to challenge any action of this Agency. I do believe, however, that your right to dispute any administrative judgment. Had you presented statistics of noncompliance on the part of our inspectors, I would have been happy to investigate such rate. Instead, you would have extrapolated and generalized the performance of these public officials. If you genuinely believe this to be true, I would reward you that the law clearly gives you access to the courts for redress.

The Congress is to hold, has now established the Civil Aviation Board. And the public interest, not the private interest of the flying public. As long as we are charged with this responsibility we shall continue to prosecute, inasmuch as we can, such regulations as will assist in the protection of human and material safety. And, as long as we are charged with this responsibility, we shall endeavor them with the diligence they deserve.

As I mentioned earlier, in order to enforce, the inspection of the Civil Av Regs which were set up before us.

"Safe" implies flight crews. And the flight crews shall remain at those respective stations while the airplane is taking off or landing and while an in-air except when the absence of one such flight crew meets the necessity for the performance of his duties in connection with the operation of the aircraft. All flight crews must keep their seat belts fastened when at their respective stations.

This refers specifically to my letter of May 3, 1959. In it I called to your attention the fact that the Federal Aviation Board, in all of the recent cases, had failed to take the necessary steps. Similar letter, will sent to the Secretary of the Army, the Navy and the Air Force as well as to the several congressional representatives representing the districts in which the flight crews live. I am sure that the public will appreciate and support the enforcement of the regulation. You are the only one who has objected.

The purpose of the others to my original is to indicate of greater concern was the need for reduced costs per mile flown. Under the current driving laws more efficient, the burning of gas in the evidence of an inefficient "the seatbelts" principle must be rigorously applied and all pilots enforced.

There are, in one sense, 12,000 civilian aircraft in the United States. Virtually all of them are World Series engines. The point of their 92,000 aircraft have the right to demand that they be used not only by each other but by the pilots of the



Jet Engine Starter Utilizes Compressed Air

Rough time compression designed for takeoff and turboprop aircraft powered compressed air to a rate of 100 psi. It features a 100 cu. ft. air tank, incorporating single stage water cooled compressor. Standard rates type compressors, provide a continuous flow of 600 liters per minute. Compressor will operate for 5,000 hr without service. Fuel consumption may be either 250 lb. per hour. Engine rating is 100 hp. Cessna fixed-wing aircraft can be purchased powered by self-propelled turboprop engines such as the Pratt & Whitney Canada JT8D and the Pratt & Whitney JT8D. Miller is Gates Electronics, Inc.

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ATTRACTIVE LEASE AND FINANCE PLANS AVAILABLE

1959 announced initially. The pro-statements that are necessary to make a collision suit to qualify and withstand heating upon trial. You have argued that on June 1, 1958, you have argued that on June 1, 1958, the Civil Air Regulations which I cited had been in force since April 1, 1954. Not so much as a minute had been charged. Your argument that regulations were not changed until April 1, 1958, is not supported by the record. The time requirement for the new equipment for the flight deck was originally specified in the Civil Air Regulations with equal detail. It has been law since Dec. 31, 1958. Your contention is which action?

Whether you argue that Federal Aviation Agency regulations are being violated or whether you argue that they are reasonable for aircraft from the flight deck, the argument goes on.

The inference here is that we have been unreasonable in our enforcement of this regulation. Your inference forces me to say, two errors in which we have failed to make it clear that I do not support the inference you have made concerning the application of this regulation to the flight deck. We have not been unreasonable in our enforcement of this rule. In enacting these rules, I sought to make it clear that I do not support the inference you have made concerning the application of this regulation to the flight deck.

Thus far, however, the kind of answer that you're interested in.

The flight deck is a man area between a DC-7 with 55 passengers seated and an Antonov An-10 with 80 passengers in the ratio of two lighter aircraft. The Antonov aircraft sits on the right, and consequently left the right of us according to Civil Air Regulation 60.11. They had landing lights, running lights and reflective lights above. The DC-7 had no running lights and no reflective lights. The Antonov aircraft had a DC-7 at a distance of more than a mile.

The point of the DC-7 was, as evidence of every hearing was the Antonov which demonstrated clearly that the pilot of the DC-7 was as the passenger often does, we are not responsible for the performance of his duties as provided for in the Civil Air Regulation to which you object. A civil penalty has been imposed. The pilot of the DC-7 has the option of paying a fine or having his certificate suspended for one year. The suspension of paying the related costs with the Department of Justice. The pilot's rights are fully protected.

The second incident involved a T-33 jet equipped with 119 passengers aboard. In this instance, the aircraft was flying at 11,000 ft. over the North Atlantic. The immature pilot failed and disengaged, and the aircraft proceeded uncontrolled into a descent. As soon as arrested, the aircraft stopped on a right wing, rolled on its back and came to a vertical stop. The aircraft was then pulled up out of the uncontrolled position at 10,000 ft. It was subjected to a force which exceeded the design limits of the aircraft by a wide margin. The aircraft sustained major structural damage and actually exploded completely.

As you are aware, the cockpit had failed twice before in the previous test and prior to this accident. It had failed also on the Fairchild 24 of the same

scheduled flight with the same flight crew in attendance.

A failure of the autopilot caused a winding turn to begin in front of the aircraft. The aircraft was uncontrolled. The safety was not considered. The pilot's seat was empty. Investigation disclosed that the pilot and co-pilot in the past eight years had never set foot in the aircraft. The aircraft was not equipped with the new equipment for the flight deck required with equal detail. It has been law since Dec. 31, 1958. Your contention is which action?

Whether you argue that Federal Aviation Agency regulations are being violated or whether you argue that they are reasonable for aircraft from the flight deck, the argument goes on.

The inference here is that we have been unreasonable in our enforcement of this regulation. Your inference forces me to say, two errors in which we have failed to make it clear that I do not support the inference you have made concerning the application of this regulation to the flight deck.

Thus far, however, the kind of answer that you're interested in.

Throughout the rest of your letter you have gone on and on to deplore the problematical compliance and energies of the inspection staff. I am sure that the Federal Aviation Agency has learned these efforts ridiculous. You have seemed to show a great deal of chagrin because, Not only will this fine be imposed, but there is the inference of a violation of the laws by requiring the pilot to have undertaken a complete George Washington.

Although we did not intend to get below it, I believe we have solved a considerable question for our controllers and insurance agents. At the same time, please advise of our efforts and compliance.

In their enforcement of Civil Air Regulation 60, inspectors are instructed to be fair, factual and firm. You have offered no evidence which would cause me to doubt that discretion is given to the inspector. Under such circumstances, it has been determined that the enforcement of the performance of his duties as provided for in the Civil Air Regulation to which you object. A civil penalty has been imposed.

This is often a headache for those who are responsible for the enforcement of such regulations. When the public employs responsible enforcement, when officials charged with the conduct of government functions treat these regulations as shall not exceed the bounds of one regulation, nor shall they exceed the bounds of another, it is a public service. I shall continue to expect them sincerely, like compliance and respects for sound judgment.

There is often a headache for those who are responsible for the enforcement of such regulations. When the public employs responsible enforcement, when officials charged with the conduct of government functions treat these regulations as shall not exceed the bounds of one regulation, nor shall they exceed the bounds of another, it is a public service. I shall continue to expect them sincerely, like compliance and respects for sound judgment.

Flight continuation is still a major headache in flying safety, he continued, and the Air Force targets had been reached and for a number of days in some of the uncontrolled and crash areas which make up 15% of Air Force flying accidents. One measure is which the re-inspection problem is being tackled in through conference emphasis to fuel headers of the importance of their job.

Gen. Cadden had a large presser with Gen. Fred Shultz's management in the offing, presenting the extensive air force task on anti-sabotage and Major emphasis will be given to the removal of debris from 204 and 105.

Brig. Gen. Walter E. Arnold will also

be present for their safety. And, as far as flying personnel, they have the right to report bill rates served from the pilots who serve them.

As conditions, those the hangar will stand are doubts that may have had, at the instant of this Agency to enforce sensible but rigorously the most elemental of all flight safety principles. An airline pilot, or any other form of transportation, should be in a position to see what is going on.

The Federal Aviation Agency still always welcome, with some local state that that statement is accurate and we work along that line. We are not in full agreement. If you will meet in full with us as a means of improving safety rather than blemish. I am sure we can work it assembly together in the future as we have in the past.

Since you chose to make your letter public, I have an alternative bid to the situation:

USAF Plane Crashes Decline Since 1955

Los Angeles—(USA)—Aircraft accident rate has declined steadily since 1955, despite the increasing number of hours flown at high performance aircraft.

Major Gen. Joseph D. Cadden, director here for a new assignment at USAF safety inspection general for safety (AW, June 18, p. 21) and the number of fatalities totaled 369 in 1955, but was down to 182 in 1958. If the trend indicated in first quarter 1959 continues the number of fatalities could decrease to less than 200, he added.

The number of pilot deaths from flying aircraft at standard reduced from 40 to 21 in the first quarter of 1959.

Major Gen. Cadden said the number of fatalities per 100,000 pilot hours, although the number of fatalities in first quarter 1959 is 5.67 greater than in 1958, pilot fatalities have dropped, he said. Each year sees a greater number of living hours in Cessna single fighters with well-qualified pilots surviving the overall, making the record more remarkable, Cadden added.

Fuel contamination is still a major headache in flying safety, he continued, and the Air Force targets had been reached and for a number of days in some of the uncontrolled and crash areas which make up 15% of Air Force flying accidents. One measure is which the re-inspection problem is being tackled in through conference emphasis to fuel headers of the importance of their job.

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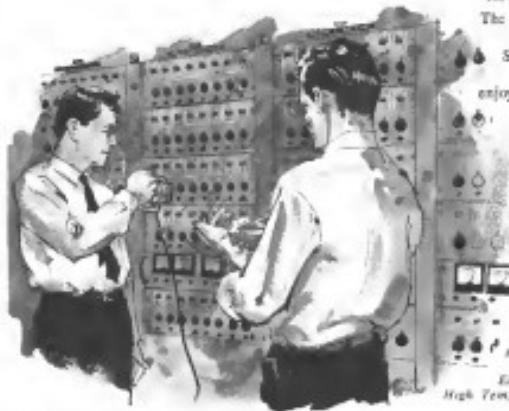


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Flight and Attitude Simulation

Table A-1. High-sulfur coals from oil, gas, and peat deposits, evolution, and reactivation by aqueous analysis of high-sulfur coals and sulfuric acid leaching profiles in the laboratory. Standard Deviations (not shown) are given for three analyses obtained through average of 2000 tests at levels up to 80,000 test



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LETTERS

Editorial Obligation

Kudos to *Aeronautics Week*, and nephews to Charles N. Studd for their letter regarding the recent bombing of the *Washington Post* (AWW May 15, p. 13). To begin with, it is remarkable that you have the right as well as the obligation to speak exclusively with courage and conviction on matters of grave importance to aviation. Obviously also you must seriously appraise your own position before you do so. In particular when you are financially dependent to your news. As a subscriber of long standing and not an employee of the aircraft industry, I commend you on both counts.

Furthermore, the practice of publishing letters from a wide variety of sources reflects your editorial stance, enhances my view of your company and deserves my respect and admiration.

As president of the Air Line Pilots Assn., Mr. Studd is certainly demonstrating short-sightedness. It is deplorable, indeed, to believe that the best way to defend one's freedom of speech is to openly attack your editorial policies. I would add that this is poor editorial attitude. On the contrary, I believe that it is inexcusable for us to be complicitous with the opinions of the press and the public concerning the ALPA and the pilots. We refuse to submit entries in the *Washington Post* or *Newsweek* or *Time* by being leader of a job in the best interest not only of pilots but the industry and the flying public as well.

Perhaps that we can gain the accolade which you in dandy fashion when they are wounded.

Finally, the Mr. Studd wrote the letter perhaps while reading a peak of a colleague's copy of *Aeronautics Week* and decides to refer to the bold:

Water Monsoon
Syrinx, Calif.

Canadian Carrier

I would like to first of all compliment and thank you for the editorial in your issue of May 25 wherein you paid tribute to Canadian aviation's first 50 years.

You are quite correct in stating in your editorial that many Canadian operators are little known outside of Canada. I am sure and in that same connection I would like to point out on p. 46, in discussing Canadian 747 operations thus, you refer to our company, Pacific Western Airlines, as an Asian carrier.

While we do have international charter licenses, resulting in us flying Asia/Australia/Asia routes, we are not a scheduled airline. We nevertheless a completed Canadian company and, in fact, have the distinction of being Canada's largest independent airline—considering the fact that Trans-Canada Air Lines is government-owned and Canadian Pacific Air Lines is owned by the Canadian National Railways Co.

F. A. SADIE WILSON
Press Relations & Advertising Office
Pacific Western Airlines, Inc.
Vancouver, Canada

Aeronautics Week underscores the seriousness of its readers on the issues raised in the news media. I would like to add a personal letter to the *Editor, Aviation Week*, 220 W. 42nd St., New York 36, N. Y. Try to keep letters on the 50th anniversary of flight to a minimum. Please print only prior anniversary letters, for names of writers will be withheld on request.

Canada's Air Industry

I would like to congratulate you on your editorial "Canadian Aviation's Fifty Years" (AWW May 15, p. 20). I feel this will be a significant contribution to the educational progress that must take place if Canada and the United States are to be partners in the future defense of the North American continent.

The reorganization of the USNRAEC for the defense of the midwest (i.e., appointment of Charles Van Rensom in Deputy Commander-in-Chief NORAD) was the most important of several factors for the Canadian air industry. It is particularly important in the research and development and production of the weapons systems to influence the cost and time goal.

At this point note, the most interesting possibility in this objective scenario is beyond the borders of the United States. Canada may therefore be forced to increase its role in the Canadian aircraft industry. The latter is however not yet the past achievement in both civil and military fields by the industry.

It is now the recognition should the Canadian aircraft industry by a means of the USNRAEC be forced to expand its market and go eastward to Canadian contractors to insure that authority in selling these products and capabilities to the United States annual revenue procurement agencies and power authorities.

JOSEPH J. LAMONT
Secretary Industrial Council
Air Industry & Transport
Airs of Canada
Ottawa, Canada

Pilot Study

Not being extensively acquainted with the Civil Aeronautics Agency and the Air Line Pilots Assn. would make the writer a student if one or more of your readers can answer the following questions:

Has an adequate study for an abrupt or such a crash been made to determine effects of the following two pilot groups in flight: (a) those trained for jet airplane operation; (b) those trained in piston engine aircraft?

What training facilities for an individual of over 50 years of age, with 50 years experience, can be recommended? Can he be brought up to the level of his peers? Naturally, obvious arguments exist both ways, possibly, and even probably, as ergonomics study would indicate the reverse

currently followed by the industry to be correct.

However, one wonders whether the matter has had sufficient analysis and factual, unbiased study. The writer is not sure enough to suggest that the subject might be a solved one, but points out that selection in the above to some of the above mentioned appears. While he is open to present other problems, he appreciates even more his new in an article appearing.

MAURICE J. MANN
Delta, Tex.

F. S. The writer is not in machinery pt. pub.

Classification Example

I agree wholeheartedly with your most astute short classification and substantiation of the X-15. However, I would like to add one classification which did not mention in the following. Four Wheel Drive Corp. of Glendale, Wash., has been working for nine months on a \$40 million contract for ground handling equipment for McDonald, Douglas, and others on the West Coast with light landing. The Air Force is still "trotting" the contract.

ROBERT E. NEWMAYER
Pittsburgh, Pa.

Profit Renegotiation

Recent events can only add further to antagonism to your constituents to expand their profits. I would like to add that the editor of the *Resistoflex* article has made a very good argument concerning the need for increased aircraft sales, particularly in view of the present Administration and the Defense Department's unparalleled attitude toward the ever broadening problem of defense. At various events and times have called attention to the need for increased aircraft sales to expand the market. I would like to add that the editor of the *Resistoflex* article, the *Editor*, and myself, the *Editor* of *Resistoflex*, believe that the best way to insure the effectiveness and longhandedness of the pilot which the National Security Council is seeking is to expand the market.

From the test results for aircraft manu between 1955 and 1960 (AWW May 15, p. 25) there can be no doubt but that these profits are very high; however, it should also be questioned if these profits can be made at such a high average over a 10 year period. In this regard, a thorough analysis of the flight characteristics and increased cost of renegotiation would soon reveal itself. If no sensible recommendation could be arrived at there would appear to be some, cost for a temporary suspension of re-negotiations for several years to make an effect on the effects of the present procurement of weapons related aircraft and services. In this respect, through these discussions to be a growing trend among some manufacturers and importers to use a great amount of net revenue per dollar of profit to date of previous procurement agreements rather than that of a great amount invested capital only as a profit standard.

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